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"HE SHALL LIFT YOU UP? THE IMPACT OF RELIGIOSITY ON ECONOMIC SUCCESS IN RURAL SOUTH AFRICA. INSIGHTS FROM A FIELD STUDY"

Master thesis in Agricultural Economics

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Abbreviations

AIC	African Independent Church
AkIC	Akaike Information Criterion
BIC	Bayesian Information Criterion
AME	African Methodist Episcopal Church
DAFF	Department of Agriculture, Forestry and Fisheries
EUR	Euro (currency)
GDP	Gross Domestic Product
KIDS	KwaZulu-Natal Income Dynamics Survey
KS-Test	Kolmogorov-Smirnov Test
OLS	Ordinary Least Squares
PCC	Pentecostal-Charismatic Church
RCC	Revival Catholic Church
StatsSA	Statistics South Africa
TFP	Total Factor Productivity
R	South African Rand (currency)
ZCC	Zion Christian Church

1 Introduction

Why are some people poor and others are rich? Why do some countries grow economically, while others don't? Why are some regions poor, while others are highly developed? Or, put in the context of rural South Africa: Why do some people have big houses and big cars while others have small houses and no car?

While these questions on the determinants of economic success and inequality have long been subject of debate in economic literature, various new approaches to explain economic performance have been developed in the past twenty-five years. According to BARRO and MCCLEARY (2003, 760) “one general conclusion is that successful explanations of economic performance must go beyond narrow measures of economic variables to encompass political and social forces.” SELINGER (2004, 524) even asserts that “the absence of the recognition of culture, and more specifically religion, in development theory and strategy” can explain “the failure of development.” In the wake of the broadening view on the causative factors of economic performance, economic research and development organizations such as the World Bank increasingly recognize religion as a factor that impacts on economic outcomes (GUISO, SAPIENZA, and ZINGALES 2003; NOLAND 2005; DE JONG 2011; SELINGER 2004).

Most prominently the notion of religiosity as a factor promoting economic success was brought forward by sociologist MAX WEBER ([1905/1920] 2002) at the beginning of the twentieth century. In his seminal essay *Die Protestantische Ethik und der 'Geist' des Kapitalismus*, WEBER argued that capitalism, particularly the capitalist way of thinking, developed out of a religious mindset. Although since then the relationship between religion and economic performance has been debated – predominantly in the social sciences – for almost a century, it is by no means clear what effect religion has on economic performance (GUISO, SAPIENZA, and ZINGALES 2003). It is only recently that economic research has begun to explore the relationship between religion and economic performance in econometric studies. The literature is commonly categorized into studies focusing on the macroeconomic level (states or regions within states) and studies focusing on the microeconomic level (individuals or households). The results are highly heterogeneous and no general effect of any religion has been unambiguously identified. Moreover, there are a number of unresolved methodological issues. In macro studies,

two of these are data aggregation and the interpolation of cross-section data with time series data. Another issue is the measurement of religion. The heterogeneity and contextuality of religion and beliefs are often not taken into account. Few studies exist that focus on single countries. Hence, particularly the question on how culture and religion affect economic outcomes at the microeconomic level needs further investigation, as FERNÁNDEZ and FOGLI (2009) and DE JONG (2011) point out. Finally, when econometrically estimating the impact of religion, it is by no means clear that the measured effect is actually due to religion. Other unobserved factors correlated with religion could be the promoters of economic success. This is known as the latent variable problem. Furthermore, it is possible that the causality runs the other way – that is, economic success determines religiosity.

Interestingly, the religious landscape of many developing countries is currently undergoing a rapid change. A new type of Christian churches, broadly subsumed under the term *Pentecostal movement*, has emerged during the twentieth century.[1] Due to the recent growth of this movement, scholars speak of a "spectacular rise" (MEYER 2004, 448). It is even seen as the "unanticipated reappearance of primal spirituality in our time" (COX 1996, 83). Social science and theological research suggests that the Pentecostal Churches foster a very intensive intrinsic religiosity. This parallels WEBER's ([1905/1920] 2002) arguments about the Protestant ethic, in the sense that increased religiosity was also the basis for the economic success of early Protestants. Many of the Pentecostal Churches preach a gospel of wealth, portraying the economic success of their members as God's will. Moreover, these churches seem to foster an equally intensive social religiosity, leading to a high level of social capital, which has economic pay-offs. Religiosity can be a motivational and supportive force (intrinsic religiosity) as well as a social-capital resource that can be employed to improve one's economic situation (social religiosity). Social sciences and theological research on Pentecostal Churches in South Africa has put forward strong arguments in favor of an economically conducive role of Pentecostal Churches. However, this research is primarily based on qualitative research and there is no quantitative substantiation to these postulations with econometric methodologies.

The purpose of this study is to investigate the impact of religiosity – defined here as the

[1] The term *Pentecostal* is used here in a broad sense. It encompasses the African Independent Churches (AIC), which emerged at the beginning of the 20th century, as well as the more recent Pentecostal-Charismatic Churches (PCC).

degree to which religion is relevant in and influences a person's life – on economic success in a particular context of rural South Africa. Specifically, the aim is to investigate if the religiosity fostered in churches of the Pentecostal movement is conducive to economic success and therefore reflected in higher household income of their members. The study seeks to relate the predications of the (predominantly qualitative) social sciences and theological research with the theoretic and methodological framework of the economic literature by analyzing data from a household survey in South Africa specifically conducted for this purpose.

This study expands the existing literature in the following ways. First, it provides a contextual approach at the microeconomic level. In contrast to most other economic studies, this reduces a number of methodological shortcomings, such as the latent variable problem as well as the problems associated with aggregation and the heterogeneity of religion. Second, it investigates the economic effect of religiosity in a specific context of rural South Africa. To my knowledge, no case study exists that explores the effect of religious communities in rural South Africa with quantitative econometric techniques. Third, it applies a methodology to the study of the economic effects of religion – the HECKMAN (1978, 1979) two-stage method to control for selection bias, cf. below – that has so far not been used in this context. Thereby, it contributes to enhancing our understanding of the role of religiosity in promoting economic success and of the impact of different religious groups, particularly of the Pentecostal movement. The approach of this study is outlined as follows.

First, the literature on Pentecostal Churches in South Africa and that on religion and economic performance is reviewed and discussed (chapter 2). The first part of the literature review focuses on the social sciences and theological literature that deals with the Pentecostal Churches and on their conducive role in promoting economic success. In the second part, the relevant econometric studies – which are mostly economic studies – are presented and discussed in comparative perspective. The unresolved issues and shortcomings of the existing literature are highlighted.

Subsequently, the theoretical framework of this study is outlined (chapter 3). Religiosity is defined, and a distinction is drawn between intrinsic and social dimensions. The mechanisms through which religiosity can transmit to economic success are then elaborated according to this distinction. The discussion on intrinsic religiosity is based on the theoretical framework of WEBER ([1905/1920] 2002), and the discussion on

social religiosity makes use of the social capital theory. Drawing on the literature on the determinants of welfare, the concept of economic success is operationalized as monetary as well as non-monetary household income (i.e., implicit income from subsistence agriculture). Household income is not only determined by the productive capacities of the household but also by the household's preferences. Therefore, based on the theory of household production a theoretical model of utility-maximizing households is developed that accommodates for changed preferences. It serves to lay open the behavioral assumptions informing the empirical analysis.

The empirical analysis in this study uses survey data collected by the author during a field study conducted in Fetakgomo Local Municipality in the Limpopo Province of South Africa from 1 August to 2 October 2011. The data set and data collection methodology are presented in chapter 4. Information was collected on socio-demographic characteristics, social involvement, geography, religiosity, and household income. Detailed information was collected on income sources, which are agriculture, social grants, informal income-generating activities, remittances, and formal income. Religiosity data is on church membership, frequency of religious attendance, frequency of prayer, and the practice of African traditional religion. With reference to the literature, contextually relevant religious categories are developed. These categories are characterized in church attendance profiles.

The data is analyzed in chapter 5. A number of regression models with household income as the dependent variable are estimated. The explanatory variables are household characteristics as well as dummy variables for the religiosity of the household head. First, log-linear models are estimated. On the basis of these models, second, a HECKMAN (1978, 1979) two-stage approach is applied in order to deal with the issues of latent variables and reverse causation. They can be seen as problems of selection bias: A variable that is not observed might cause people to select a certain church *and* to have a higher household income; or higher income causes people to select a certain church. This would bias the results. In the HECKMAN approach, a control function estimator is included in the regression equation that accounts for the decision to become a church member. Third, a multiplicative dummy model is estimated. This intrinsically nonlinear model can better accommodate for the effect of changes of preferences due to religiosity.

Finally, the results are summarized and the key findings discussed (Chapter 6).

Moreover, the scope of future research is highlighted.

2 Literature Review

2.1 Social Sciences and Theology: The Pentecostal Movement

Since the beginning of the 20th century, many developing countries, especially in Sub-Saharan Africa, have seen the emergence and growth of new types of churches. These churches can, in very general terms, be subsumed as belonging to the Pentecostal movement (ANDERSON 2001, 7–8; ANDERSON 2004, 1; MAFUTA 2010; SELINGER 2004).[2] The Pentecostal movement has its origin in late 19th century North America. It spread out in two waves. The first one took place at the beginning of the 20th century causing Pentecostal Churches to spread to other parts of the world. It triggered the development of so-called African Independent Churches[3] (AICs) (ANDERSON 2000, 28; SUNDKLER 1961, 38–64). In the past 30 years, a second wave of Pentecostal Churches with a "distinct form, in terms of scale, theology, and religious practice" emerged (MEYER 2004; cf. ANDERSON 2000, 26). They can be termed Pentecostal-Charismatic Churches (PCC). These new Pentecostal Churches attract such a vast number of people that scholars do not only discuss their "mind-boggling growth" (MALULEKE 2000, ix) and "spectacular rise" (MEYER 2004, 448) but even consider them the "unanticipated reappearance of primal spirituality in our time" (COX 1996, 83). Their growth largely takes place in Asia, Latin America, and Sub-Saharan Africa. They particularly attract young, middle-class educated people in urban areas (ANDERSON 2000, 26). Hereafter, the term Pentecostal Churches is used to denote both AICs and PCCs.

While the Pentecostal movement is extremely heterogeneous (DICKOW 2011), its basic distinctive features can be described as "oral liturgy and a narrative theology and witness, maximum participation in worship and service, visions and dreams in public worship, and an understanding of the relationship between the body and the mind manifested by healing through prayer" (HOLLENWEGER 1986, 5–6, cited in ANDERSON 2000, 24). The focus in those churches is on the "*experience* of the working of holy spirit and the *practice* of spiritual gifts", such as healing and speaking in tongues (ANDERSON 2000, 24–25, emphasis original). ANDERSON (ibid., 31) writes on the rise of

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[2] Though this subsumption is criticized by some scholars (cf. Anderson 2000, 31; cf. Anderson 1995, 284), it cannot be ignored that (strictly) Pentecostal Churches of the second wave and AICs share a common origin as well as common characteristics. Furthermore, the distinction between AICs and PCCs is not always clear (Meyer 2004a, 452).

[3] The terms "African Indigenous Churches" and "African Initiated Churches" are also found in the literature.

the Pentecostal movement:

> "The […] message of deliverance from sickness and from the oppression of evil spirits, and especially the message of receiving the Holy Spirit who gives people power to cope in what is often perceived as a hostile spirit world, was welcome indeed. This was a religion that offered solutions to *all* life's problems, and not only 'spiritual' ones – it absorbed the whole week, and not just Sunday. This new and exciting type of Christianity at last provided concrete answers [...], covering every area of human life and fulfilling all human needs."

In AICs church badges are worn every day, worships take place more frequently than once a week, and a series of regulations of the way to lead one's life are observed, from not eating pork to abstaining from liquor and tobacco (cf. MAFUTA 2010). "Communal and personal purity and integrity", according to MAFUTA (ibid., 8) are

> "grounded in the belief that salvation purifies the whole person, who in turn is called to live in harmony within her/himself and the community. […] In addition […] members find their motivational energy for economic conduct in reinterpreting their eschatology within the framework of their sociological predicament. […] Salvation/liberation, in this context, is more here-and-now than there-and-then."

MEYER (2004a, 460) describes PCCs in the following way:

> "[They] appear to alert believers not to lose themselves in crude consumptive behavior and to use wisely the money they earn. People should avoid drinking alcohol, leading a loose moral life, and, in the case of men, squandering money with 'cheap girls'. […] The ideal is a moral self, not misled by the glitzy world of consumer capitalism nor misguided by the outmoded world of tradition, but instead filled with the Holy Spirit."

The parallels to WEBER's theory ([1905/1920] 2002) are striking. Life is regulated by religion and the spirit immediately influences people's lives. Belief becomes a worldly issue of everyday-life and not limited to religious space. The Pentecostal Churches foster an intensive religiosity, both with respect to its intrinsic and its social dimension. This is precisely what WEBER saw as the basis for the economic success of early Protestants (see section 3.2; cf. MEYER 2004a, 460).

Pentecostal Churches in South Africa have been studied in the social sciences and religious studies as well as by theologians. The results suggest that both the Pentecostal Churches of the first wave, AICs, and those of the second wave, PCCs, foster economic performance (GARNER 2000). MEYER (2004) points to two distinct features of Pentecostal Charismatic Churches. First, charismatic preachers preach a "prosperity gospel" of God's will being members to become rich. As a PCC preacher from the Universal Church of the Kingdom of God in Soweto put it, "God doesn't want you to be poor and ashamed – he wants you to drive a new car" (quoted in HARRISON 2007).

Second, they “promise to link up their born-again believers with global circuits” (MEYER 2004a, 448). In terms of the transmission mechanisms outlined above, the first aspect relates to the intrinsic dimension and the second aspect to the social dimension. Furthermore, some churches provide micro loans to promote the economic upliftment of their members (ibid., 459). MAFUTA (2010) provides a detailed study on the Zion Christian Church (ZCC), the largest AIC in South Africa and the dominant church in the municipality surveyed for this study. According to MAFUTA (ibid., 8), members of the ZCC “are known for their communal and personal purity and integrity,” causing them to be more successful in the labor market. Employers assume that they are “hardworking, disciplined, obedient and sober”. A similar claim is made by GARNER (2000). GARNER conducted a field study of Pentecostal Churches in Edenvale, a township near Pietermaritzburg in South Africa (documented in GARNER, 2004a). He concludes that churches that feature “indoctrination, experience, exclusion and socialisation” have the greatest effect on social change. These characteristics are particularly present in PCCs, but in some AICs as well. In his account of the relatively small Pentecostal Church “Breakthrough International” MEYER (2004a, 287) comes to the following conclusion that the experience of the members exceeds a mere gospel of prosperity:

> “Being poor is a matter directly linked to one’s personal spirituality, because by being in touch with the King one will receive the Kingdom's goods. […] [I]t is a kind of message which seems to be backed up by what the people of Breakthrough International experience on a personal level. Russell Toohey [the pastor] calls it the experience ‘redemption and lift', which [...] means that as people are redeemed they are lifted up in their social standing and their lives stabilize.”

On the basis of a recent survey in South Africa, DICKOW (2011) finds that members of PCCs are upwardly mobile, assume responsibility for improving their own lives, and display an optimistic view on the future.

So far, however, little research has focused distinctly on the economic effects of Pentecostal Churches in South African context (MAFUTA 2010, 3). GARNER (2000, 314) agrees: “Pentecostalism among Black South Africans is a little researched phenomenon.” Moreover, most of the studies mentioned above use qualitative, ethnographic methods such as interview, group discussion, and participant observation. Surveys yielding quantitative information are used as well (e.g., by ANDERSON 1992; GARNER 2000; 2004; 2004a; and DICKOW 2011), but the data is analyzed with descriptive statistics only. Econometric methods are not used to further validate the

conclusions drawn.

2.2 Economics: Quantifying the Impact of Religiosity

In economic research, the relationship between religion and economic success has recently gained increasing attention. The research can be categorized in macro and micro studies (GUISO, SAPIENZA and ZINGALES 2003; DE JONG 2011). Macro studies use aggregated cross-country data, relating aggregated country-wide indicators of religiosity to a country's economic growth rate. Micro studies, on the other hand, use individual or household data, relating individual or household indicators of religiosity to individual or household economic outcomes. Most of the literature deals with macro studies. Subsequently, an overview of the recent research is presented. Thereafter it is evaluated in comparative perspective. Only econometric studies are included in the literature review, since this is the methodology employed in my study.

2.2.1 Macroeconomic Studies

To my knowledge, GLAHE and VORHIES (1989) provide one of the first econometric studies that investigate the impact of religion at macro level. They assess the correlation of religious beliefs, economic liberty, and development. The measure of development includes the per capita gross domestic product (GDP) as well as indicators of education and health. The data set includes 150 countries. In Jewish and Christian countries, they find that political liberty is positively correlated with development. This is not the case in Muslim and other countries, for which they do not find a significant relationship. Calculating an index of “Judeo-Christian Democracy” by using the population share that is Jewish or Christian and an index score of political liberties, GLAHE and VORHIES show a positive relationship between religion and liberty on the one hand and development on the other. They conclude that “Judeo-Christian” countries are more likely to be democracies and if they are capitalist they are more likely to have higher levels of economic development.

In the approach by HEATH, WATERS, and WATSON (1995), it is not countries that constitute the units of observation, but federal states of the United States of America. They regress average per capita income inter alia on the percentage of the states' population that is Jewish, Catholic, liberal Protestant and fundamentalist Protestant. The strongest effect on per capita income is exerted by fundamentalist Protestantism

and is negative. The authors attribute this to the inimical attitude of fundamentalists toward liberal values. Furthermore, Judaism has a positive effect, while the effect of Catholicism is negative, though not to an extent similar to that of fundamentalist Protestantism.

GRIER (1997) evaluates the effect of different religions in 63 former colonies. A dummy variable for the growth rate of Protestantism is included in a neoclassical growth equation and the level of Protestantism is included as a regressor in a per capita income equation. The results are that Protestantism can explain part of, but not all of the difference in economic performance between former Spanish and French (i.e., Catholic) colonies on the one hand and former British (i.e., Protestant) colonies on the other hand.

BLUM and DUDLEY (2001) investigate the development of 316 European cities from 1500 to 1750 using a theoretic approach based on game theory as well as the theory of networks. Their argument is that Protestants are more likely to be reliable trade partners and hence better economic networks emerged in Protestant northern Europe. Population growth of the cities is used as a proxy for economic growth and among the explanatory variables are dummies for Protestantism as well as “network effects” variables. The empirical results show that the effect of Protestantism in itself is only positive and significant in some of the model specifications. The network variables, on the contrary, always have significant explanatory power for Protestant cities. For Catholic cities there is no such effect. The authors conclude that Protestantism does not have a direct intrinsic effect in the sense that Protestants are more successful because they are thriftier, more hard-working, and more frugal. According to BLUM and DUDLEY (2001), the effect rather transmitted through information networks that developed because Protestants had a higher propensity to honor their contracts even with unknown people and thus lead to economic success of the Protestant cities.

Catholic and Protestant cities are also used as data in the study by CANTONI (2010). In this study the growth of 272 cities in the German lands from 1300 to 1900 is investigated. Differing from BLUM and DUDLEY (2001), CANTONI's results do not support the hypothesis that Protestant cities are economically more successful.

The most influential study of recent years is the research done by BARRO and MCCLEARY (2003). Their approach is based on the predications of the WEBER thesis and a theoretical framework that views religious attendance as an input of the religious

sector and beliefs as its output. The sector is taken to be more productive the larger the relation of beliefs to attendance is. Aggregated survey data on religiosity and the medium-term growth rates of up to 41 countries are used. Data from three survey waves is used, yielding a total of 118 observations. The variables describing religiosity are monthly church attendance, belief in heaven, and belief in hell. They are included as explanatory variables when empirically analyzing differences in growth rates. The results of BARRO and MCCLEARY's regressions show that beliefs, particularly belief in hell, positively affect growth, while monthly church attendance has a negative effect. Relying on an instrumental variable approach, the relationship is given a causal interpretation. The authors conclude that "stronger religious beliefs stimulate growth because they help sustain specific individual behaviours that enhance productivity" (ibid., 779). In a subsequent study, MCCLEARY and BARRO (2006) obtain the same results with an increased number of observations (53 countries, yielding 153 observations).

MANGELOJA (2005) uses a similar theoretical framework as BARRO and MCCLEARY (2003) and MCCLEARY and BARRO (2006), but a different methodology. He investigates the influence of belief in hell (taken as an indicator of religious belief), religious attendance, and religious sector productivity (as defined by BARRO and MCCLEARY) on economic growth. Data from 8 countries and the time span from 1971 to 2001 is used, yielding 31 observations for each country.[4] Data from all countries is analyzed as panel data; data from single countries is analyzed as time-series data. In the panel data regression, only belief in hell has a significant positive effect. In the time-series regressions, religious productivity is only significant and positive in the case of Finland. Furthermore, the following effects are significant: Belief in hell has a positive effect for Finland and Spain (in line with BARRO and MCCLEARY's findings), but a negative one for Sweden. As in BARRO and MCCLEARY (2003) church attendance has a negative effect, albeit in MANGELOJA's study only for Finland and Spain. There is, however, a positive effect for Japan.

SALA-I-MARTIN, DOPPELHOFER, and MILLER's (2004) conduct a meta analysis of studies investigating economic growth. Among the 18 out of 67 significant variables feature three religious ones: the fraction of the population that is Confucian, the fraction that is Muslim, and the Buddhist fraction. Protestantism does not have a significant effect.

[4] However, as DE JONG (2011, 122) points out, the respective survey data is only available for four waves during that time frame, thus impossibly yielding 31 independent observations.

These results are surprising, since commonly Protestantism is thought to have a positive effect. On the other hand, the study is quite illustrative for the recent tendency to include religion in empirical studies on economic growth. The positive effect of a number of different religions relates well to the idea that what is important is the degree of religiosity and not a particular doctrine.

Focusing particularly on the alleged negative effect of Islam, NOLAND (2005) performs a cross-country analysis of up to 78 countries as well as a within-country analyzes of India, Malaysia, and Ghana. Mid-term and long-term GDP growth and growth in total factor productivity (TFP) are used as dependent variables; the religious variables are the population shares adhering to a specific religion. In the regression of mid-term TFP growth, none of the religions have a significant effect. In the regression of mid-term GDP growth, however, the Jewish, Catholic, and Protestant population shares have a significant effect that is negative. In the long-term regression, on the other hand, those three have a significant positive effect. The mid-term country results show a significant positive effect of Buddhist, Jain, and other religion shares on GDP growth, but none on TFP. For Malaysia, NOLAND finds no significant effect when accounting for ethnic differences. In the Ghanaian regression only the Muslim share has a significant positive effect. The effect for Christian shares is insignificant, regardless of the inclusion of only the Christian share or the different denominations. Hence, the picture drawn by NOLAND's various regressions is heterogeneous. The main point NOLAND highlights is that Islam never has a negative effect.

ORTIZ (2009) studies the influence of religion on GDP growth and changes in TFP for seven Latin American countries. He uses combined time-series and cross-sectional data survey data on religiosity. In this method, data from 50 years are used as 50 different observations, thus the focus is more on time-series data. This is similar to HEATH, WATERS, and WATSON (1995), GRIER (1997), MANGELOJA (2005), BARRO and MCCLEARY (2003) and MCCLEARY and BARRO (2006), who combine cross-sectional with time-series data as well. Except for MANGELOJA (2005), however, their focus lies more on the cross-sectional data since they use far less time-series observations than cross-sectional observations. In ORTIZ's (2009) study, the Catholic, Protestant, Jewish, and Muslim share of the population are included in a standard economic growth equation, inter alia education, civil liberties indices, and trade openness. Interestingly, the share of Catholics has a significant positive effect in almost all countries, both in the

regression of growth as well as in the regression of TFP. One exception is Uruguay. The effect of Catholicism is contrary to most other studies. Judaism and Islam have a significant positive influence on growth and TFP in Argentina and Brazil, respectively, while in Chile and Costa Rica Protestantism has a significant positive effect on TFP.

2.2.2 Microeconomic Studies

There are few micro level studies that directly deal with the effect of religion on economic performance. GUISO, SAPIENZA, and ZINGALES (2003, 231) argue that studies need to focus not on outcomes, such as measures of economic performance or even specific institutions, but on attitudes that foster such outcomes. Outcomes, so they argue, are "the result of attitudes, but also of the surrounding environment." At the core, this is a latent variable argument: Something we do not observe and that is (perhaps even accidentally) correlated with the measures of religiosity might influence economic performance. Such latent variables could, for example, be historic events not accounted for. Hence, a number of studies investigate the influence of religiosity not on economic or institutional outcomes, but on values, most notably on trust.

One of the earlier studies that focuses on economic outcomes is the study by CHISWICK (1983). In an analysis of United States census data of the 1950s, CHISWICK finds that Jewish men have higher earnings and higher returns to schooling. He uses a standard earnings equation with the natural logarithm of earnings as the dependent variable. One intriguing aspect of this study is that a reverse causality (i.e., earnings affecting membership in Judaism) is hardly conceivable. Relatively few people who are not born Jewish become Jewish since, at least in the conservative interpretation, the only way to become a Jew is to be born of a Jewish mother.

CUESTA (2004) uses survey data from Honduras to perform an analysis of the effect of trust and community participation. He also uses religious variables as explanatory variables. Although CUESTA terms his religious variables "religious values," what is actually used is religious affiliation (ibid., 14). The dependent variable serving as a proxy for household welfare is the degree to which basic needs are not satisfied. While trust and participation have a significant effect, religion does not.

In a more recent study, BETTENDORF and DIJKGRAAF (2010) estimate the effect of religious affiliation on household income in a cross-country micro level approach using

survey data from 25 countries. The dependent variable is the income decile the household falls into. In their regressions church membership indeed has a heterogeneous effect: while it positively influences income in high income countries, the effect is negative for countries with low income. The results are robust to changes in the measure of religiosity, for example, to the respondents' beliefs or their self-assessment of religiosity. The same authors perform an analysis of household data from the Netherlands in BETTENDORF and DIJKGRAAF (2011). In this study, the results differ according to the model specifications. The only robust result is a significant negative effect for adherents of Islam.

In another cross-county micro level study, GUISO, SAPIENZA, AND ZINGALES (2003) measure the effect of religion not on economic outcomes such as income, but on economically conducive attitudes. Those attitudes are, for example, the attitude toward cooperation or the attitude towards the market. Survey data from 55 countries is used. Religious upbringing, self-assessed religiosity, and religious participation are used as religious variables. On average, they find, more religiosity is associated with more economically conducive attitudes. This effect, however, is strongest for Christian denominations.

SAKWA (2006) provides the only quantitative study that focuses on a limited population, in this case Catholic university students in Nairobi. The author provides extensive theoretical considerations on the economic effects of religion and analyzes how the students' attitudes towards biblical conceptions of poverty influence their attitudes on poverty alleviation objectives. The data was gathered by means of a survey with 357 observations. The approach is exploratory. The relevant categories of attitudes as well as the relevant poverty alleviation objectives are derived from the survey responses by means of factor analysis. The poverty alleviation objectives are insurance, income, assets, and education. The results show that all the attitudes toward biblical concepts of poverty have a significant positive effect on attitudes on poverty alleviation objectives. This means, for example, that if one believes that God blesses those who care for the poor, one would be in favor of providing health care and social security to poor people (ibid., 116).

AUDRETSCH, BOENTE and TAMVADA (2007) seek to determine if religion has an effect on occupational choice in India. They find that Muslims and Christians are more likely to become entrepreneurs, while Hindus are less likely.

BRAÑAS-GARZA, ROSSI, and ZACLICEVER (2009) estimate the effect of religion on attitudes of trust toward others, institutions, and the market system using Latin American survey data. The religious variables are the degree of religious practice and dummies for affiliation with religious groups. The results of the analysis are that Catholic affiliation as well as Catholic practice correlate with trust toward others and that affiliation and practice of all religions correlates positively with trust in governmental institutions like the judiciary.

In the case of Germany, TRAUNMÜLLER (2011) finds that Protestantism as well as religious service attendance increases interpersonal trust, a finding that tends to support BLUM and DUDLEY's (2001) network hypothesis. The dependent variable is a combination of the survey responses to questions on the inclination to trust others. Similar results were reached by studies in other countries (TRAUNMÜLLER 2011, 11).

Furthermore, there are numerous studies that focus on the influence of religion on variables related to economic success, such as health, fertility, education, and criminal behavior (see IANNACCONE 1998, 1475–1478, for a survey of the literature).

Table 1 summarizes the findings of the studies presented. As becomes clear from the overview, the results of the various quantitative approaches are highly ambiguous and do not allow for any general conclusions to be drawn. The results differ not only with respect to which religions have economic effects, but also with respect to the sign of this effect and even if there is such effect at all.

Study	Cate-gory	Geographic scope	Dependent variable	Religious variables	Effect (+ = positive, – = negative)
Audretsch, Boente and Tamvada (2007)	micro	India	entrepreneurship	affiliation	Islam + Christianity + Hinduism –
Barro and McCleary (2003)	macro	41 countries	GDP growth	belief in heaven and hell, religious practice, religion shares	belief in hell + religious practice –
Bettendorf and Dijkgraaf (2010)	micro	25 countries	household income deciles	affiliation	in high income countries + in low income countries –
Bettendorf and Dijkgraaf (2011)	micro	Netherlands	household income	affiliation	none Islam –
Blum and Dudley (2001)	macro	Europe (cities)	city population growth	dummy for dominant religion	+
Brañas-Garza, Rossi, and Zaclicever (2009)	micro	Latin America	trust in governmental institutions	religious practice, affiliation	Catholicism +
Cantoni (2010)	macro	Holy Roman Empire, Germany (cities)	city population growth	dummy for dominant religion	none
Chiswick (1983)	micro	USA	individual income	affiliation	Judaism +
Cuesta (2004)	micro	Honduras	unsatisfied basic needs	affiliation	none
Glahe and Vorhies (1989)	macro	150 countries	development	classification as “Judeo-Christian democracy”	+
Grier (1997)	macro	63 former colonies	GDP growth, per capita income	growth of Protestantism, religion shares	Protestantism +
Guiso, Sapienza, and Zingales (2003)	micro	55 countries	attitudes	religious upbringing, self-assessed religiosity, religious practice	+
Heath, Waters, and Watson (1995)	macro	USA	per capita income	religion shares	Judaism + Catholicism - fundamentalist Protestantism –
Mangeloja (2005)	macro	8 OECD countries	GDP growth	belief in hell, religious practice	+/ambiguous
McCleary and Barro (2006)	macro	53 countries	GDP growth	belief in hell, religious practice, religion shares	belief in hell + religious practice –
Noland (2005)	macro	78 countries, India, Malaysia, Ghana	GDP growth, TFP growth	religion shares	ambiguous (Islam +)
Ortiz (2009)	macro	Latin America	economic growth, TFP	religion shares	Catholicism +
Sakwa (2006)	micro	Nairobi	attitudes	attitudes	+
Sala-i-Martin, Doppelhofer, and Miller (2004)	macro	worldwide	GDP growth	religion shares	Confucianism + Islam + Buddhism +
Traunmüller (2011)	micro	Germany	interpersonal trust	religious practice, affiliation	Protestantism +

Table 1: Econometric Studies on the Economic Effects of Religiosity

2.3 Comparative Discussion

The existing approaches have a number of shortcomings and thus have been criticized from a number of angles. The first issue is the use of aggregated data in macro studies. The number of countries in the world is limited, so the size of the data set is limited as well. For many of the countries data on religiosity is unavailable further reducing the number of observations. GLAHE and VORHIES (1989) use data from 150 countries, GRIER (1997) from 63, MCCLEARY and BARRO (2006) from 53, BARRO and MCCLEARY (2003) from 41, and HEATH, WATERS, and WATSON (1995) from 50 federal states. While not quite as limited, this also applies to the number of cities of BLUM and DUDLEY (2001) and CANTONI (2010). The limited number of observations results in low degrees of freedom of the econometric models applied (GUISO, SAPIENZA, and ZINGALES 2003; MANGELOJA 2005). A somewhat extreme example are the within-country regressions of NOLAND (2005) who, for example, uses 10 independent variables with 13 observations for Malaysia. Furthermore, aggregation inevitably entails a loss in information. As DE JONG points out, the use of dummy variables for the dominant religion in a country is not suitable simply for any country. While it can be assumed that in pre-modern German and European cities, as used by BLUM and DUDLEY (2001) as well as CANTONI (2010), almost all inhabitants share the same religion, this is not the case in modern states. “If in a country 35 per cent of the population is officially a member of the Roman Catholic Church and 30 per cent is Protestant, then the country is labeled as Roman Catholic.” Hence, “[A] country is listed as belonging to a particular religious group simply because a large minority belongs to this group” DE JONG (2011, 118).

Second, one has to be very careful when combining cross-sectional with time-series data as performed in a number of macro studies. ORTIZ (2009), MANGELOJA (2005), and BARRO and MCCLEARY (2003), for example, include the same country or region at multiple points in time as separate observations in order to increase the number of observations and thereby the degrees of freedom. However, particularly religious affiliation and religious beliefs do not change quickly, much less in the time span of one year as implicitly assumed by ORTIZ (2009). To a certain extent, this procedure carries the danger of multiplying existing observations and thus getting unreliable results. Cross-country micro studies avoid the loss of information associated with aggregation and allow to control for country-fixed effects. Since the data is not aggregated it contains enough observations to include additional control variables, for example,

accounting for institutional differences. One example thereof is the study by BETTENDORF and DIJKGRAAF (2010), which accounts for different effects in different groups of countries. The fact that their results differ widely from BARRO and MCCLEARY's (2003) although using a largely overlapping data set illustrates the relevance of this issue.

Third, religions are implicitly assumed to be homogeneous (DE JONG 2011). It is assumed that a certain category of religion in one country has the same features as in other countries. This applies to all cross-country approaches, macro and micro level studies alike. This assumption of the homogeneity of religions might perhaps be valid for a centrally organized religious group like the Catholic church, but is very much questionable for Protestantism, which splits into a large number of denominations, or the heterogeneity within Islam. This point also applies to BLUM and DUDLEY's (2001) and CANTONI's (2010) studies. They compare Protestant to Catholic cities without taking into account the different Protestant denominations and their different realizations in Germany and Europe: Calvinism, Lutheranism, Pietism and so forth. Furthermore, religions are treated differently by different states. In (former) socialist countries the population might formally be adherent to a specific religion, but the actual religiosity might be much lower due to the state's enmity towards religion. In different contexts, one religious category can differ vastly. In Germany, for example, people who are Protestants are mainly members of the denominations that originated in the Reformation of the 16th century. In Latin America, on the other hand, the majority of Protestants are members of Pentecostal Churches. Although these churches are part of the Protestant spectrum, they differ substantially from the traditional European Protestant denominations in religious practice as well as religious belief.

Fourth, survey responses on religiosity such as belief in heaven or hell are likely to convey different meanings in different contexts as well as across different denominations and religions. Hence, simple yes/no responses to questions like “do you believe in hell?” or “do you belief in heaven?” can hardly be compared without further qualification as to what meaning these concepts convey to the repsondents. Such generalizations are already problematic within a single country. The concept of “hell” might mean quite different things to conservative Protestants in the rural German Ore Mountains (Erzgebirge) and to liberal Protestants in the city of Berlin. A striking example of the gross generalization often employed in the literature is MANGELOJA

(2005). In this study, belief in hell is taken as an indicator of religious belief in general: "Scandinavian countries are typical examples of modern secular societies, with low levels of religious beliefs, seen in the low levels of belief in hell […]." Such a point of view shows insufficient theological substantiation.

Fifth, the homogeneity assumption is certainly more valid when the area under consideration is only a single country or region. Examples of such studies are BETTENDORF and DIJKGRAAF (2011), CUESTA (2004), SAKWA (2006), AUDRETSCH, BOENTE and TAMVADA (2007), and TRAUNMÜLLER (2011). Their disadvantage, however, is that the results cannot be generalized to other countries (GUISO, SAPIENZA, and ZINGALES 2003, 230).

Sixth, it is difficult to interpret an observed correlation as a causal relationship. Most of the studies interpret their empirical results in a causal way on purely theoretical grounds. Any such assumption, however, can be disputed. Therefore, it is necessary to pose the question if one is really picking up an effect of religion. As mentioned above, two other explanations are possible: The first one is that there could be unobserved variables that affect both, economic performance and religion. A second explanation could be that the causality runs from economic performance to religion or the causality goes both ways, that is, the two are interdependent. While reverse causation and latent variables can always be a problem in regression analyses, they become more severe when aggregating data to the level of political entities. In the case of countries, states, regions, and cities, institutional differences or specific historic events might cause differences in economic growth and at the same time correlate with or cause certain religions or degrees of religiosity. Those institutional differences are not taken into account (GUISO, SAPIENZA, and ZINGALES 2003, 230; NOLAND 2005, 1222).[5] Furthermore, due to the low degrees of freedom, the possibility of including additional control variables in macro studies is limited. In micro studies these issues are less severe. Nonetheless, as GUISO, SAPIENZA, and ZINGALES (2003, 250) remind us, it is always possible that latent variables influence the results of the estimation. A number of studies try to control for endogeneity using instrumental variable techniques. This method is employed by BARRO and MCCLEARY (2003), BLUM and DUDLEY (2001), and CANTONI (2010). However, as BARRO and MCCLEARY (2003) point out themselves, the

[5] The early study of GLAHE and VORHIES (1989) is an extraordinary severe case here. Due to its bivariate regression it does not take into account any additional variables other than religion/liberty and development.

causal interpretation depends on the assumption that the instruments predicting religiosity are really independent from economic growth. In their study those are dummy variables for the existence of a state religion, for state regulation of religion, and the degree of religious pluralism. The validity of this assumption needs to be doubted. For historical reasons, state regulation of religion and the presence of a state church is high in Western and Central European countries such as Germany, Sweden, or the United Kingdom, resulting ultimately from the medieval conjunction of state and church. Those are also the economically successful countries. In most developing countries, in which statehood developed much later, state regulation of the religious sector and the existence of state churches are far less common. Hence, religious regulation and economic performance correlate as both describe the same countries. This can be viewed as a problem of a latent variable affecting both growth and state regulation of religion. Similar arguments can be made concerning BLUM and DUDLEY (2001), and CANTONI (2010): It might well be that the geographic variables used as instruments have an impact on growth. The previous location within the Roman Empire could have influenced the development of institutions and the distance from the city Wittenberg in the middle of economically thriving Saxony might also be correlated with economic prosperity and city growth. NARAYAN and PRITCHETT (1999, 880) formulate this in a very general way: “The drawback [of instrumental variable approaches] is that one must have valid instruments and, worse, the validity of the instruments depends entirely on theoretical arguments about the structure of the model.”

Finally, any results from regression analyses have to be tested for the robustness to changes in model specifications. Recently, BARRO and MCCLEARY's (2003) findings have been attacked on this ground. Through a robustness test with the same data set using different model specifications DURLAUF, KOURTELLOS, and CHIH (2011) show that there is no effect of religious beliefs on economic growth. They conclude that such effect rather depends on “ad hoc modeling choices” (ibid., 994).

In summary, micro studies have a number of advantages over macro studies. They avoid the loss of information due to aggregation and the troubles associated with low degrees of freedom. Thus, there is no need to interpolate cross-section with time-series data, and more explanatory variables such as institutional differences across countries can be taken into account. All cross-country approaches, however, are based on the questionable religious homogeneity assumption and do not take into account the

contextuality of religious beliefs. Moreover, the possibility of latent variables is difficult to avoid. While the three last issues also apply to within-country studies, the problems increase with the heterogeneity of the data set. The more diverse the population under consideration is, the more likely it is that religious beliefs differ and the more variables can possibly influence the results. Rural/urban differences, geographical factors, cultural differences, languages, and history are all possible factors that systematically affect both religiosity and economic performance. In order to isolate the impact of religiosity on economic performance, approaches at the local level, not at country or world level seem more promising. A positive example thereof is SAKWA (2006). The local level approaches, however, entail the shortcoming of lacking generalizability.

2.4 Gaps in the Literature

The literature discussed above can be categorized into studies at macro level and studies at micro level. Macro studies relate aggregated indicators of religiosity to economic variables such as GDP growth, while micro studies relate individual religiosity to individual economic outcomes. The literature does not yield any unanimous conclusions, neither with respect to a correlation between religiosity and economic outcomes in general, nor with respect to the effect of specific religions/denominations like Protestantism, or the direction of such effects (cf. DE JONG 2011 for a similar conclusion). It is noteworthy, however, that none of the quantitative econometric studies explicitly deal with the effect of Pentecostal Churches, not in the South African context nor in any other. From a methodological point of view, micro studies avoid some of the shortcomings of macro studies. It has become clear from the research of the past years that it is difficult to robustly show universal effects of religiosity across different data sets and model specifications. A more fruitful approach is to conduct contextual research at micro level and in culturally homogeneous settings. Only few such approaches exist and thus this postulate is found in a number of studies (DE JONG 2011 and NOLAND 2005, but also AUDRETSCH, BOENTE, and TAMVADA 2007 and CANTONI 2010). Research needs to focus on impacts in particular contexts. This enables us to take into account the contextually relevant categories of belief systems and excludes a large number of possible latent variables. Although the results are not necessarily generalizable, such research can contribute bit by bit to our understanding of the role religiosity plays in fostering economic success. It is a more viable approach than trying to find a world wide uniform effect from a large size aggregated data. HEATH, WATERS,

and WATSON (1995) illustrate the question on the relationship of religion and economic performance with the metaphor of “a puzzle that is far from being solved.” Puzzles are solved by putting small pieces together. The research presented hereunder seeks to provide one such piece.

3 Theoretical Framework

This section outlines the theoretical foundations that inform the analysis to follow. Departing from a definition of religiosity, the mechanisms of how religion can transmit to economic success are explained. Particular reference is made to WEBER's ([1905/1920] 2002) idea of the 'Protestant ethic' and to the social capital theory. Subsequently, a theoretical model of a utility-maximizing household is developed that can account for changed preferences due to religiosity. The purpose of this section is to lay open the behavioral assumptions in which the empirical analysis is rooted and to provide a reasoning for its structure and the variables used.

3.1 Definition of Religiosity

I largely follow IANNACCONE's (1998, 1466) definition of religion, with one slight modification in the interest of clarity. According to IANNACCONE religion is “any shared set of beliefs, activities, and institutions premised upon faith in supernatural forces.” There is, however, an ambiguity in the meaning of the word *institution*. It can refer to an organization, as used in common speech, and it can refer to a rule and its enforcement mechanism (KIWIT and VOIGT 1995, 122–123) as used in institutional economics. Since both aspects are important, I suggest to modify IANNACCONE's definition of religion to *any shared set of beliefs, activities, organizations, and institutions premised upon faith in supernatural forces*. The definition of religiosity used in this analysis draws on WEBER ([1905/1920] 2002, 152), who uses the term *kirchlich-religiöse Beherrschung des Lebens*.[6] This is precisely the way religiosity is understood here: the degree to which religion, as defined above, is relevant in and influences a person's life.

This definition encompasses two dimensions (cf. HAYNES 2009; SELINGER 2004; NOLAND 2005). The first dimension is intrinsic. It refers to belief, spirituality, transcendence, values, and ethics as well as individual religious activities, such as prayer or the lecture of religious scripture. Second, religiosity has a social dimension. Beliefs are shared within a group of people that engage in common activities and form religious organizations. Such activities are worship services as well as any other activities of a religious community. Furthermore, religious communities have rules their members observe and the violation of which is sanctioned by the group. The more intense these beliefs are, the more intense activities are practiced, the more activities are

[6] Ecclesiastic-religious domination of life.

attended, the more the religious group regulates daily life, the higher a person's religiosity. In short, the more one's life is dominated by religion, the more religious one is. These two dimensions are closely interrelated and are mutually influential. Hence, the distinction should not be seen as a strict separation, but rather as a schematic tool for the analysis. In particular, it allows us to categorize the transmission mechanisms accordingly (cf. DE JONG 2011, 112). Religion is thought to affect economic performance in positive as well as negative ways (BETTENDORF and DIJKGRAAF 2010). In this thesis the focus lies on the (possible) positive effects. Therefore, in the following only the transmission mechanisms of positive effects are described.

3.2 Transmission Mechanisms of Religion to Economic Success

3.2.1 The Intrinsic Dimension – Max Weber Revisited

WEBER ([1905/1920] 2002) suggests that in certain protestant traditions the religious ethic of a well-led life (to be hard-working and frugal) as well as the perspective of an (either very positive or very negative) afterlife caused the adherents of these traditions to embrace a work-ethic that was to strongly foster the development of capitalism (ibid. 196; 221). The Protestant traditions WEBER refers to are Calvinism, Pietism, Methodism, and the Anabaptist movement. Three concepts are of particular importance. First, according to WEBER the aforementioned strands of reformation theology asserted that God had a *calling* for every person. This means the profession one had was not merely a job to survive, but a mandate from God (ibid. 205). The only way to please God was to fulfill one's worldly duties (ibid. 188). Second, these denominations advocated what WEBER terms *innerweltliche Askese*[7] (ibid. 197). If one spent time and resources not according to one's *calling*, one acted against God's will. Since, for example, leisure time and excessive consumption withdraw resources from the glorification of God, they should not be practiced more than necessary to maintain one's productive power (ibid. 204). Third, according to the Calvinist doctrine of predestination, the afterlife of every person was already decided upon from the very beginning. This decision, however, was unknown to the person. The state of grace could only be ascertained through success in life, particularly economic success in one's profession (ibid. 221). Being successful in life meant that a person was blessed and would go to heaven, whereas lacking success indicated the opposite. It is not a matter of working hard in order to be in a state of grace, but a matter of working hard to assure

[7] Inner-worldy asceticism.

oneself of being in a state of grace. In summary, the Protestant denominations under consideration saw their profession as a calling from God, any time not spend on the glorification of God (by fulfilling the calling) as sinful time, and their economic success as an indicator of their afterlives. These are excellent presuppositions for economic performance. In the long term, as WEBER sees it, this *Protestant ethic* secularized and became part of the culture of Protestant countries and regions. It transformed into the *spirit of capitalism* that promoted economic performance at macro and micro levels.

From the very beginning, WEBER's thesis has been the subject of an intense scholarly debate. As a matter of fact, it even evolved out of a discourse in the social sciences between the Marxist and cultural sociology perspectives on social change. The Marxist view is that economic and social structures influence culture, ideas, norms, and religion. WEBER, explicitly opposing such interpretation, argues that the influence is in the opposite direction (ibid., 166). Here culture, ideas, norms, and religion shape economic and social structures (cf. DOEPKE and ZILIBOTTI 2008). Against this background it is not surprising that WEBER's thesis of the Protestant ethic is a disputed field and the discussion in the literature is far from unanimous (IYER 2008). Nonetheless, his considerations provide a useful background to the empirical research employed here. The WEBER thesis will thus be used here as one theoretical framework that allows us to deduce empirically testable hypotheses. According to WEBER ([1905/1920] 2002, 151–152) the basis of the development outlined in the preceding paragraph was an increase of religiosity brought about by the reformation:

> "[D]ie Reformation […] bedeutete die Ersetzung einer höchst bequemen, praktisch damals wenig fühlbaren, vielfach nur noch formalen Herrschaft durch eine im denkbar weitgehendsten Maße in alle Sphären des häuslichen und öffentlichen Lebens eindringende, unendlich lästige und ernstgemeinte Reglementierung der ganzen Lebensführung. […] Nicht ein Zuviel, sondern ein Zuwenig von kirchlich-religiöser Beherrschung des Lebens war es ja, was gerade die Reformatoren [...] zu tadeln fanden."[8]

It is important to note that it was an increase of ecclesiastic-religious domination of life – that is, an increase of religiosity – that was constitutive for the protestant ethic and the development of the spirit of capitalism. We will return to this result in the next section. In their summary of WEBER's thesis BARRO and MCCLEARY (2003, 771) state that

[8] "The reformation […] meant the replacement of a highly comfortable, at the time practically hardly sensible, in many cases only formal authority by an endlessly tedious and sincere regulation of the way to lead one's life which penetrated all spheres of private and public life to furthest degree conceivable. […] The reformers […] did not criticize that there was too much ecclesiastic-religious domination, but not that there was not enough."

"individual traits such as honesty, work ethic, thrift, and openness to strangers" are fostered by religious beliefs and have a positive influence on economic performance (cf. GUISO, SAPIENZA, and ZINGALES 2003 and GARNER 2004).

Another aspect of intrinsic religiosity is emotional support through religion (cf. MANGELOJA 2005). Religious beliefs provide a system of values, norms, and identity that serve as a (psychological) support structure for the individual within the system. CILLIERS and WEPENER (2007) use the term *spiritual endurance*. In this respect, the fact that religion offers transcendence is important. Because of religious belief, individuals might be able to cope better when confronted with adverse circumstances. Intrinsic religiosity can increase a person's resilience against external shocks, such as the death of a family member, natural catastrophes, criminal acts, and poverty. This is particularly relevant in contexts characterized by a high level of adversity, like in developing countries.

3.2.2 The Social Dimension

Most economic research on religiosity focuses on its intrinsic dimension. SELINGER (2004, 540) argues that this does not grasp the reality in many developing countries "where private belief […] is irrelevant compared to the social and economic realities of religious identity." It is indeed essential to take into account the social dimension of religiosity as well. Social religiosity can be viewed as a form of social capital. Numerous definitions of social capital exist. The working definition employed here follows BOURDIEU (1983, 190–191), who defines it as

> "die Gesamtheit der aktuellen und potentiellen Ressourcen, die mit dem Besitz eines dauerhaften Netzes von mehr oder weniger institutionalisierten *Beziehungen* gegenseitigen Kennens oder Anerkennens verbunden sind; oder, anders ausgedrückt, es handelt sich dabei um Ressourcen, die auf der *Zugehörigkeit zu einer Gruppe* beruhen" (emphasis original).[9]

As a number of studies have shown, social capital is a resource that has economic returns (see WOOLCOCK and NARAYAN 2000 for an overview). Hence, religiosity can affect economic outcomes through its social dimension. Again, this is particularly relevant in contexts of weak political and economic structures. Where financial sectors are underdeveloped, property rights are insecure and the enforceability of contracts is unreliable, social capital becomes an even more important factor (KNACK and KEEFER

[9] "the totality of present and potential resources that are related to the ownership of a permanent network of more or less institutionalized *relations* of mutual acquaintance and recognition; or, expressed differently, these are resources that are based on the *affiliation with a group*.

1997; cf. WOOLCOCK and NARAYAN 2000; and CUESTA 2004). The social dimension of religiosity can have the following economically conducive features.

First, religious social networks constitute support structures one can rely on if in need (WOOLCOCK and NARAYAN 2000). If a member of a group experiences external shocks, such as illness or the loss of a job, support might be provided by the group. DEHEJIA, DELEIRE, and LUTTMER (2007) show that religious participation has an insurance function against negative income shocks. Therefore, membership in a religious group is effectively a form of risk mitigation.

Second, COLEMAN (1988, S104) notes that social networks provide information channels and thereby reduce transaction costs (cf. WOOLCOCK and NARAYAN 2000). Being part of a social network makes it easier to find partners for economic interaction. In order to build a house, one needs a builder. Instead of looking one up in the telephone book, one might just know someone in the congregation. Moreover, through the denominational structures individuals might get into contact with members of the same denomination in a city or another country. This can open up otherwise inaccessible opportunities (SWART 2006). Transaction costs are also reduced "through the provision of external enforcement mechanisms, such as monitoring and social sanctions," as BINZEL and FEHR (2010, 2) point out. If one sees the person to whom one sold a car every week, incentives are higher to make sure the car actually works.

Third, religious groups produce club goods that one can gain access to by affiliation (COLEMAN 1988, S103–S104). Club goods are goods to which access is limited to a specific group. In religious groups, for example, diaconical projects, schools, savings groups, and micro loans can have club good characteristics (cf. MAFUTA 2010, 166–169; and MEYER 2004a, 459).

Fourth, social networks are a basis for collective action. Mutual trust within the group reduces the problem of free-riding (cf. SWART 2005). Trust is an important requirement for collective action to be effective, be it political lobbying or the common management of resources (OSTROM 2002). As SWART (2005, 28) puts it, social capital based on trust and reciprocity will lead to "networks and partnerships of collective effort and mutual responsibility through which the problems of poverty and other social ills will be solved best." Furthermore, institutions might exist that reduce problems of free-riding and adverse selection as suggested by IANNACCONE (1992). The group members might

hence be able to pursue their interests more effectively and engage in joint economic activities, such as community gardens.

These four transmission mechanisms through which religious social capital affects economic outcomes apply to other groups and networks as well. So, is there anything that is unique about religious social capital? SWART (2005, 28) asserts that "[g]iven the quality and extent of its networks as well as the general trust that it commands, the religious sector could be presented as a special agent and generator of social capital." CILLIERS and WEPENER (2007) emphasize the importance of religious rituals in this regard. According to them, it is through religious ritual that mutual trust is constantly created and (re-)affirmed. WEPENER (2010) points to the role of *commensality*, the shared meal, in religious contexts. Another aspect are the values transported by religious rituals (WEPENER et al. 2010). Specific values transported by religious communities more than by other groups or organizations "contribute to and sustain social capital" (ibid., 11). These theoretical arguments show that the intensity of the social ties and the trust created by joint worship, joint prayer, and joint spiritual experience might well constitute a very intense form of social capital that is specific to churches. Furthermore, in many developing countries, especially Sub-Saharan Africa, not many large social organizations exist. In contrast to many developed countries, where trade unions, political parties, or sports clubs constitute large networks, most networks do not exceed the local (village) level. Therefore, religious groups are the primary source of social capital in many developing countries (cf. SWART 2006).

3.2.3 Positive Network Externalities

Another transmission mechanism that combines the intrinsic and the social effects outlined above is what BLUM and DUDLEY (2001) term *positive network externalities*. In a very interesting approach, the authors use a game theoretic framework to show that the increase in religiosity suggested by WEBER caused Protestants to become more reliable trading partners. Religious domination of life provided additional incentives not to defect in economic interaction. Subsequently mutual trust and reliability in Protestant regions increased, leading to better economic performance of these regions. This is essentially the same argument brought forward by some social capital scholars. PUTNAM (1993) argues that Northern Italy's better economic performance in comparison with the south of the country can be explained by the historic existence of civic traditions and

horizontal networks. These traditions and networks fostered norms of trust and reciprocity, with long-term positive economic effects. In a cross-country investigation, KNACK and KEEFER (1997) find further empirical evidence for PUTNAM's (1993) hypothesis. However, since such effects are region or country-wide and long term, they exceed the scope of this study.

3.3 The Determinants of Household Welfare

After having defined religiosity and having outlined its transmission mechanisms to economic success, it is necessary to operationalize the concept of economic success. For the purpose of this study, the amount of household income – including both explicit monetary income and implicit income from subsistence agriculture – is the indicator of the degree of economic success. The term, however, can be misleading. By using household income, I focus on the relative economic situation of a household in comparison with others around it. Here, economic success is not understood as getting tremendously rich, but rather seen as doing comparatively well. For many people in rural South Africa, the question might not be to become rich or not but to be able cope or not.[10] As GARNER (2004) puts it, the issue is survival, not prosperity. The concept of economic success as used here is intended to capture this notion.

In order to determine the impact of religiosity on household income it is appropriate to depart from the empirical literature on the determinants of household welfare. A number of studies investigates the determinants of household welfare at the microeconomic level using data from various different countries. To name a few examples, GROOTAERT (1997) investigates the determinants of poverty in Côte d'Ivoire and Indonesia. NARAYAN and PRITCHETT (1999) provide an analysis of household income and social capital in rural Tanzania. An investigation of poverty in Burkina Faso is provided by GROOTAERT, OH, and SWAMY (2002), while GROOTAERT and NARAYAN's (2004) focus on household poverty in Bolivia. YUSUF (2008) analyzes the effects of social capital in Nigeria, and BRÜCK (2004) investigates farmers' activity choices and the effects thereof on welfare in post-war Mozambique. These studies take into account differences in household composition, regional characteristics, ethnicities, education, endowments, and social capital.

Most studies mentioned above are based on GLEWWE's (1991) framework. GLEWWE

[10] I thank the participants of the summer school “Social Impact of Christian Communities” for bringing this to my attention.

outlines a theoretical framework for measuring household welfare and applies it to household data from Côte d'Ivoire. Household welfare is taken as a synonym for household utility and it is assumed that a household utility function exists (ibid., 308). Intra-household decision-making processes are not considered in this framework. Since household welfare/utility is unobservable, household expenditure is used as a proxy for it as in many similar studies. This is largely due to the difficulty of accurately measuring income in contexts where formal monetary earnings are only a small part of total household income. Furthermore, informal income can be quite volatile and households are assumed to smooth their consumption through saving and dissaving.[11] Consumption at a specific point in time is thus likely to be a better indicator of the household's permanent income than (monetary) income at that same point (NARAYAN and PRITCHETT 1999). Particularly in agriculture, where income is seasonal, this is quite intuitive. Nevertheless, under the assumption that on average income is entirely used for consumption, both should have the same value in the long run. As NARAYAN and PRITCHETT (1999) point out, income and consumption are conceptually the same thing and can thus be used interchangeably. The assumption that all income is spent also underlies GLEWWE's (1991) framework. Assuming a utility-maximizing household, his starting point is the household's expenditure function, dependent on prices, household characteristics, and the utility level desired by the household. He uses this function to derive a reduced form estimate of the "various structural relationships (earnings function, agricultural production functions, etc.) which affect welfare" (ibid., 309). Subsequent studies use the reduced form estimates as a basis without explicitly laying out the theoretical framework.

Religion can only to a certain extent be included in such a framework. As outlined above, social religiosity constitutes social capital. In the studies mentioned in the previous section, social capital is assumed to be "truly 'capital' and hence has a measurable return to the household" (GROOTAERT and NARAYAN 2004, 1189). Its accumulation requires resources and stocks of it can be increased or decreased. As NARAYAN and PRITCHETT (1999) show by means of instrumental variable estimation, it is not a consumption good whose level of consumption increases with income. Social capital is rather an asset like human or physical capital that constitutes a resource household use when maximizing welfare. Therefore, it can be included as an

[11] This is the permanent income hypothesis brought forward by Milton Friedman (cf. Deaton 1997, 350–351).

explanatory variable of household income. NARAYAN and PRITCHETT's study even includes social religiosity. Church membership is one of the social capital variables in their model.

However, to include religiosity as social capital does not grasp the intrinsic dimension of religiosity. To view intrinsic religiosity as a household asset would be too narrow. It is not only a resource the household uses in order to maximize consumption. Rather, intrinsic religiosity changes the household's preferences and thus causes it to make different consumption and production decisions (cf. DOEPKE and ZILIBOTTI 2008). This, however, poses an analytical problem with respect to the framework used in the studies on the determinants of welfare. The observed consumption (or income) level is assumed to be optimal. If utility is only drawn from consumption, any change in preferences will lead to the same consumption level. As long as income is constant, the value of total consumption must remain unchanged as well, since total consumption is restrained by total income. Hence, the model cannot accommodate for an effect of changed preferences. In the following two sections, I will outline a theoretical framework that allows me to model the effect of changed preferences.

3.4 Assumptions

I refer to the household production model of the new home economics as outlined by BECKER (1965) and MICHAEL and BECKER (1973) as well as LOW's (1986) *model of the indigenous farm-household in southern Africa* (cf. the overview of both models in ELLIS 1993). BECKER's household production approach is the basis of LOW's model, which is specifically adapted to deficit-producing households in southern Africa (i.e., households that are not self-sufficient with respect to agricultural production). This applies to most households in the rural areas of South Africa (DRIMIE et al. 2009). This model bears more resemblance to the situation in rural northern South Africa than the widely used standard neoclassical farm household model by BARNUM and SQUIRE (1979), which is usually applied to surplus-producing households in south-east Asia.

The most basic assumption of the household production model is that the household is the appropriate unit of analysis rather than the individual (MICHAEL and BECKER 1973, 388). It has one (common) utility function. This is also the basis of GLEWWE'S (1991) framework as noted above. Like GLEWWE, I will not address the question on the dynamics of intra-household decision making. I assume that a household utility function

exists and that the household has one utility maximization problem.

Following the new home economics framework, it is assumed here that utility is not immediately drawn from goods and services bought in the market. The household transforms market goods into so-called z-goods, which enter the household's utility function. Such a z-good is “the seeing of a play, which depends on the input of actors, script, theater and the playgoer's time; another is sleeping, which depends on the input of a bed, house (pills?) and time” (BECKER 1965, 495). As ELLIS (1993, 126) puts it, “it is not the carrots, potatoes, and beans which yield utility, but the vegetable soup made from them which possesses utility-giving attributes.” In addition to market goods, the household uses time as an input in the production of z-goods. In this it resembles a firm producing output from capital and labor (MICHAEL and BECKER 1973). Therefore, the household is not only a consumption but also a production unit. Market goods and time are transformed into z-goods according to the household production function. The model does not distinguish between time spent on the production of z-goods and leisure. In fact, they are to a large extent leisure activities.

In order to apply this model to farm households, it is necessary to further distinguish the goods produced in subsistence production. Combining the approaches of BECKER (1965) and LOW (1986), I propose to distinguish between market goods, subsistence goods, and z-goods. Market goods, $x_1, \ldots, x_X$ (indexed by subscript l; X denotes the number of market goods), are goods the household purchases in the market. Subsistence goods, $s_1, \ldots, s_S$ (indexed by k; S is the number of subsistence goods), are goods produced in subsistence agriculture. Such s-goods are sorghum harvested in the fields, tomatoes grown in the garden, firewood gathered in the hills, or cattle bred by the household. To a certain extent, s-goods can be substituted by equivalent market goods. But they can possess additional characteristics that yield utility to the household, which their market substitutes do not have. Such characteristics include the prestige that comes with cattle ownership and the cultural value of home grown sorghum to brew traditional beer. Perhaps most important for the context of rural South Africa is the prestige entailed by owning cattle (cf. ibid., 39–40). These additional non-consumption characteristics of subsistence goods can be a reason why subsistence production is continued even at low productivities, which LOW observes in his study and which I also observed in my field research. The utility-yielding z-goods, like vegetable soup, beer made from sorghum, or sleeping, will be denoted by $z_1, \ldots, z_Z$ (indexed by j; Z is

the number of subsistence goods). Market goods, subsistence goods, and time are combined in their production.[12]

Following LOW (1986; cf. ELLIS 1993), I am making the following assumptions with regard to the economic environment.

(1) The traditional land tenure system permits flexible access to land. The bigger a household is, the more land it is allocated. Hence, land is abundant for the household and the marginal productivity of subsistence agriculture is constant.

(2) A labor market exists in which wage rates differ across household members, for example, men and women. Some members have a comparative advantage in wage work and the household is faced with decreasing returns to wage labor as more members are allocated to wage labor.

(3) Retail and selling prices of agricultural produce are different. The selling price of a good produced by the household is lower than the price of buying the same good or a substitute thereof.

Using these assumptions, the subsistence production of the household can be viewed as follows. Subsistence goods can either be produced within the household or substitutes can be bought in the market. Assuming the time necessary to buy the good in the market is negligible, the household buys the good in the market if the market price of the subsistence good is lower than its costs in household production:

$$p_{s_k} < \boldsymbol{x_k}\,\boldsymbol{p_x} + t_m^s w_m \tag{1}$$

$$\Leftrightarrow \quad \frac{p_{s_k} - \boldsymbol{x_k}\,\boldsymbol{p_x}}{t_m^s} < w_m\,, \tag{2}$$

where p_{s_k} is the market price of the subsistence good or a market substitute, $\boldsymbol{x_k}$ is a $1 \times X$ vector of market inputs used for production of s_k (such as fertilizer and machinery) with X denoting the number of those market inputs, and $\boldsymbol{p_x}$ is an $X \times 1$ price vector of those inputs. t_{mk}^s ($k = 1, \ldots, S$) is the amount of time needed by household member m to produce s_k, and w_m is household member m's market-earning potential (i.e., the wage rate). The term on the left hand side in equation (2) is the opportunity cost of purchasing the good s_k (or its substitute) in the market. If it is

[12] This is different than in LOW (1986), who assumes any goods produced in subsistence agriculture to be z-goods. However, this is incoherent in light of the basic model by BECKER (1965). Clearly, a bag of sorghum does not yield utility by being harvested but rather by being consumed after being ground and transformed into porridge or beer. As ELLIS (1993) puts it, it is the soup that yields utility, not the vegetables. Hence, subsistence produce are not z-goods per se, but can – like market goods – be transformed into z-goods.

lower than the market-earning potential of m, the good is purchased rather than produced. Therefore the allocation of labor in the household depends on the market-earning potential:

> "The time of household members with the greatest comparative disadvantage in wage employment will be allocated to subsistence production first, followed by members with increasing comparative advantage in wage employment until, either the household's requirement for the subsistence […] good is satisfied, or the next member's wage rate becomes greater than his opportunity cost of purchase, in which case the balance of requirements will be purchased" (LOW 1986, 37).

In the LOW model, cash-cropping will only be done once the household's requirement of the subsistence good has been met. This is so because buying and selling prices are assumed to differ. The price at which a certain good can be bought in the market will be higher than the price it can be sold for. Below the subsistence requirement the relevant price on the left hand side of condition for subsistence production (equation (1)) is the retail price at which the subsistence good or its market substitute can be bought. Above the subsistence level it will be the lower selling price. It thus follows from equation (2) that the minimum wage at which household members are allocated to wage labor is lower beyond the subsistence requirement (LOW 1986, 41). The threshold from subsistence to market production depends on the household's consumer/worker ratio, but not on household size. The smaller this ratio is, that is, the more working members in relation to non-working members it has, the more likely it is to produce beyond its subsistence requirement (ibid. 43–44).

3.5 Formal Model

The resultant model can be formalized as the subsequent utility maximization problem:

$$\max_{z_1, z_2, \ldots, z_Z \in \mathbb{R}^+} U_i(z_1, z_2, z_3, \ldots, z_Z), \tag{3}$$

where $U_i(z_1, \ldots, z_Z)$ is household i's utility function dependent the z-goods $z_1, \ldots, z_Z$ and $\mathbb{R}^+$ are the non-negative reals. The maximization is subject to the following constraints:

$$z_j = f(\boldsymbol{x}_j, \boldsymbol{s}_j, \boldsymbol{t}_j) \tag{4}$$

$$s_k = g(\boldsymbol{x}_k, \boldsymbol{t}_k) \tag{5}$$

$$\sum_{m=1}^{M_i} t_m = \sum_{m=1}^{M_i} t_m^w + \sum_{m=1}^{M_i} t_m^s + \sum_{m=1}^{M_i} t_m^z \tag{6}$$

$$I_i = N_i + \sum_{m=1}^{M} t_m^w w_m + \sum_{k=1}^{S} p_{s_k} s_k = \sum_{l=1}^{X} p_{x_l} x_l + \sum_{k=1}^{S} p_{s_k} s_k \quad (7)$$

Equation (4) is the household's production function of the good z_j. The production factors are $\boldsymbol{x_j}$, a $1 \times X$ vector of market goods, $\boldsymbol{s_j}$, a $1 \times S$ vector of subsistence goods, and $\boldsymbol{t_j}$, a $1 \times M_i$ vector of quantities of the household members' time where M_i is the number of household members of household i. Equation (5) is the subsistence goods production function, with $\boldsymbol{x_k}$ a $1 \times X$ vector of market inputs used to produce s_k and $\boldsymbol{t_k}$, a $1 \times S$ vector of quantities of the household members' time used to produce s_k. Equation (6) is the household's time constraint. Household time is either spent on wage labor, household subsistence production (production of s-goods), or on household production of z-goods. The total time available to the household is given as the sum of all M_i individual household members' time entire contingents. t_m is the entire time contingent of household member m. It can be divided into

$$t_m^w, \; t_m^s = \sum_{k=1}^{S} t_{mk}^S, \text{ and } t_m^z = \sum_{j=1}^{Z} t_{mj}^z. \quad (8)$$

t_m^w is the time m spends working in the formal or informal labor market, t_m^s is the time m spends producing s-goods, and t_m^z is the time m spends producing z-goods. Equation (7) is the income constraint, with I_i household i's total income, which is composed of the household's non-labor income N (such as rents, social grant and remittances) and all household members' labor income

$$\sum_{m=1}^{M_i} t_m^w w_m, \quad (9)$$

where w_m is the market-earning potential of household member m (LOW 1986, 14), that is, the market wage m receives in the labor market. In addition to this monetary income, the implicit income from subsistence production, subsistence goods valued by the price of their market substitutes, is included. It is assumed that all monetary income is spent on market goods and therefore the sum of the values of the purchases equals monetary income:

$$N_i + \sum_{m=1}^{M_i} t_m^w w_m = \sum_{l=1}^{X} p_{x_l} x_l. \quad (10)$$

The time constraint (6) can be rephrased to

$$\sum_j t_j^w \;=\; T - \sum_j t_j^z - \sum_j t_j^s \tag{11}$$

and plugged into the income constraint, yielding

$$I_i \;=\; N_i + \sum_{m=1}^{M_i} (t_m - t_m^z - t_m^s)\cdot w_m \,. \tag{12}$$

Adding the value of the time spent on household production of z-goods and s-goods yields the "full income" constraint Q

$$I_i + \sum_{m=1}^{M_i} t_m^z w_m + \sum_{m=1}^{M_i} t_m^s w_m = \sum_{m=1}^{M_i} t_m w_m + N_i = \sum_{l=1}^{X} p_{x_l} x_l + \sum_{k=1}^{S} p_{s_k} s_k + \sum_{m=1}^{M_i} t_m^z w_m = Q \,. \tag{13}$$

The concept of "full income" not only includes monetary income and the value of the subsistence production but also the value of the household's time spent not working. It is independent of the amount of time allocated to income generating activities (MICHAEL and BECKER 1973, 382; LOW 1986, 14). The constraint implies that the value of the household's time plus non-labor income must equal the value of market goods plus the value of the time allocated on production of z-goods, that is, doing things other than working for money.

It is useful to express the inputs in z-production in terms of the input vectors of the respective z-goods:

$$\sum_{l=1}^{X} p_{x_l} x_l = \sum_{j=1}^{Z} \boldsymbol{x_j p_x} \,,\; \sum_{k=1}^{S} p_{s_k} x_k = \sum_{j=1}^{Z} \boldsymbol{s_j p_s} \,,\; \sum_{m=1}^{M_i} t_m^z w_m = \sum_{j=1}^{Z} \boldsymbol{t_j w} \,, \tag{14}$$

where $\boldsymbol{p_x}$ ($X\times 1$) and $\boldsymbol{p_s}$ ($S\times 1$) are the respective price vectors of the market and subsistence goods and $\boldsymbol{w}$ is the $M_i\times 1$ vector of wage rates (cf. MICHAEL and BECKER 1973, footnote 1).

The resulting maximization problem can be solved using the Lagrange method. The Lagrangian is

$$L \;=\; U_i(z_1, z_2, z_3, ..., z_Z) - \lambda\Big(\sum_{j=1}^{Z} (\boldsymbol{x_j p_x + s_j p_s + t_j w})\Big) \,. \tag{15}$$

The first order conditions are

$$\frac{\partial L}{\partial z_j} \;\stackrel{!}{=}\; 0 \;\Leftrightarrow\; \frac{\partial U}{\partial z_j} \;=\; \lambda\Big(\frac{d\,\boldsymbol{x_j}}{d\,z_j}\boldsymbol{p_x} + \frac{d\,\boldsymbol{s_j}}{d\,z_j}\boldsymbol{p_s} + \frac{d\,\boldsymbol{t_j}}{d\,z_j}\boldsymbol{w}\Big) \,, \tag{16}$$

where $\frac{\partial U}{\partial z_j} = MU_j$ is marginal utility of z_j. $\frac{d\,\boldsymbol{x_j}}{d\,z_j}$, $\frac{d\,\boldsymbol{s_j}}{d\,z_j}$, and $\frac{d\,\boldsymbol{t_j}}{d\,z_j}$ are the marginal input-output coefficients of the market goods, the subsistence goods, and of

the time used in the production of z_j, respectively. The marginal input-output coefficients express the quantity of time, market inputs, and subsistence goods needed to produce z_j. The term

$$\left(\frac{d\,\boldsymbol{x_j}}{d\,z_j}\,\boldsymbol{p_x} + \frac{d\,\boldsymbol{s_j}}{d\,z_j}\,\boldsymbol{p_s} + \frac{d\,\boldsymbol{t_j}}{d\,z_j}\,\boldsymbol{w}\right) \tag{17}$$

is therefore the *full price* of a marginal unit of z_j (cf. BECKER 1965, 497). It takes into account the respective time of the household members – which has different money values – the market inputs, and the subsistence inputs used to produce z_j. Denoting the *full price* by π_j, Equation (16) becomes

$$MU_j = \lambda\,\pi_j\,. \tag{18}$$

λ is the marginal utility of income as in the conventional utility maximization approach of microeconomic theory (cf. NICHOLSON 2002, 99). Rearranging (18) to

$$\frac{MU_j}{\lambda} = \pi_j\,. \tag{19}$$

has an intuitive interpretation: In the optimum, the value of the marginal utility z_j yields to the household has to equal the full price of it, that is, the sum of the values of the weighted inputs. These inputs are the market goods valued by their market price (as in the conventional utility maximization approach) but also the time inputs of the household members valued by their market-earning potential and the input of subsistence goods valued by their retail price. The crucial feature of this framework is that the allocation of time by the household is explicitly taken into account. In contrast to the conventional utility-maximization approach, utility is maximized not only subject to a budget constraint but also subject to the household production function, a subsistence production function, and a time constraint.

The household does not strive to maximize its income as reflected in the model. It rather maximizes its utility, which depends on z-goods. These z-goods are produced by the household using the inputs time, market goods and subsistence goods. The choice on the allocation of time depends on the household's valuation of the respective z-goods, that is, their marginal utility. The concept of z-goods allows to include a large variety of aspects. One example is risk aversion. As shown above, risk mitigation is one of the functions of social capital. In order to mitigate the risk from being unemployed, the household engages in subsistence production activities. In this framework, risk mitigation can be seen as a z-good that primarily requires subsistence goods as input. A

second example is the accumulation of wealth in itself. It can be seen as a z-good. The household can strive to be wealthy even without physically consuming its wealth. This insight is useful when trying to incorporate the desire for the accumulation of wealth as brought forward by WEBER as the “spirit of capitalism.” Such considerations are left out when assuming an income-maximizing household. Here, observed outcomes that are not income-maximizing can still be optimal because of the household's preference structure. The structure of the household's preferences can lead to the preference of risk mitigation over income or the preference of leisure activities over work. The decision on how much household time to allocate on wage labor, subsistence production, or z-production depends on the prices of market goods, on the market-earning potential of the household members, and the household's subsistence productivity. But it also depends on the relative valuation of different z-goods, that is, the shape of the household's utility function.

In the conventional microeconomic approach of individual utility maximization, the quantity demanded is a function of prices and income: $x^* = d_x(p_1, \ldots, p_n; m)$, the relationship of which is determined by the individual's preferences as expressed in the demand function d_x. In the same way here, the household's demand for z-goods is influenced by the shape of the household's utility function. If the household prefers z-goods that have a high market good input component (such as cars, TVs, travel or saving money), more time will be allocated on wage labor (or subsistence production) in order to raise the income level and to increase the possibilities to purchase those goods. If the household has a preference for z-goods that require a high subsistence good component such as the prestige conveyed by owning cattle relatively more time will be allocated on subsistence production. Finally, if the household has a preference for time intensive z-goods (such as social activities, spending time with the family), less household time will be allocated to wage labor.

In the conventional approach, income is not affected by changed preferences. This is not the case in the model presented here. The household determines the income it requires since it chooses the amount of time to allocate on wage labor and on subsistence. It allocates exactly such amount of time on labor so that income is enough to purchase the market good requirements of all quantities of z-goods consumed:

$$\sum_{l=1}^{X} p_{x_l} x_l = \sum_{j=1}^{Z} z_j^* \frac{d\boldsymbol{x_i}}{dz_i} \boldsymbol{p}_x . \qquad (20)$$

Of course, this is subject to the time constraint the household faces and the market-earning potentials of its members. It is by no means assumed that the household can simply generate as much income as it wishes. As subsistence goods and market goods are to a large extent substitutes, it is appropriate to include subsistence production in the definition of income:

$$I_i = \sum_{l=1}^{X} p_{x_l} x_l + \sum_{k=1}^{S} p_{s_k} s_k = \sum_{j=1}^{Z} z_j^* \cdot \frac{d\,\boldsymbol{x}_j}{d\,z_j}\,\boldsymbol{p}_{\boldsymbol{x}} + \sum_{j=1}^{Z} z_j^* \cdot \frac{d\,\boldsymbol{s}_j}{d\,z_j}\,\boldsymbol{p}_{\boldsymbol{s}_i}. \qquad (21)$$

Household income, including both explicit monetary income and implicit income from subsistence agriculture, has to be high enough to acquire the market and subsistence good requirements of quantities of all z-goods the households wishes to consume. Of course, only market goods are purchased, but they can be substituted by subsistence goods.

The production and consumption decisions in this model are interrelated, differing from the standard farm household model by BARNUM and SQUIRE (1979; 1979a; 1984; cf. SINGH, SQUIRE, and STRAUSS 1986). Their model is recursive in the sense that the farm household's income is determined only by the price of its agricultural produce, the market wage, and its production technology (SINGH, SQUIRE, and STRAUSS 1986a, 6–7). Hence, first the household's optimal production can be determined and then the result can be used to determine the optimal consumption. Because of this separability property such models are also called separable models. LOPEZ (1986) is the first one to provide a non-separable model that allows for interdependent utility- and profit-maximization decisions. DE JANVRY et al. (1992) provide another example. The model used here falls into the category of non-separable models as well. Furthermore, the model does not assume that households maximize their income and that income is a proxy for household utility. As Narayan (2001, 40) points out, utility, or well-being, is much broader than income or consumption:

> "Poor people's definitions of well-being are holistic. The good life is seen as multidimensional, with both material and psychological dimensions. It includes a dependable livelihood, peace of mind, good health, and belonging to a community. I encompasses safety; freedom of choice and action; food; and care of family and spirit."

The model presented here can accommodate for such broad definition of utility. Income is only one part of the household's utility-maximization problem.

In order to explain differences in household income I, variables that explain (a)

differences in market-earning potentials (wages), (b) differences in subsistence productivity and (c) differences in preferences, that is, in the households' utility functions need to be taken into account. Such variables relate to the economic environment, the household's characteristics, and its endowments (GROOTAERT and NARAYAN 2004). Although from the structural model above it follows that prices have an influence, they cannot be employed as explanatory variables here, as they are the same across all households. The variables can be grouped into five categories (cf. GLEWWE 1991):

(1) Household composition variables. The number of children, the consumer/worker ratio, the age and sex of the household head all influence the market-earning potential as well as the utility function.

(2) Geographic variables. The more remotely located a household is, the less its access to job markets, the lower its market-earning potential.

(3) Human capital variables. Education and health clearly influences the market-earning potential, but can also change preferences (cf. ibid., 313). Intuitively, a person who can read is more likely to want to read books than a person who cannot.

(4) Social capital variables. Social capital is a productive resource. Social status variables are included here as well.

(5) Religiosity variables. Religiosity can constitute social capital as well as shape preferences.

4 Data Set

4.1 Research Methodology

The data used in this study was gathered in a household survey conducted in August and September 2011 in Fetakgomo Local Municipality in South Africa. Structured interviews were conducted to collect quantifiable information on the religiosity of the household head and agricultural as well as non-agricultural household income. Furthermore, the questionnaire included questions on the socio-demographic characteristics of the household, distances from roads and central places, membership to groups and social status (cf. the questionnaire in appendix 1).

4.1.1 Motivation of Field Research

Although data on income and on religious affiliation is available from a number of surveys and censuses in South Africa, there was a need for a separate study with a new data set (cf. Garner 2004a, who arrives at the same conclusion). Mainly, this was due to the inadequacy of existing surveys in terms of the income measurement and of the religious categories employed. The official censuses and surveys conducted by Statistics South Africa do not normally include informal income or implicit income from agriculture. In the 2001 Census, 37 percent of the households in Fetakgomo Municipality reported no income and according to the more recent 2007 Community Survey, 80 percent of the individuals between the ages of 15 and 65 have no income (source: own calculations using data from the Statistics South Africa (StatsSA) Time Series Database [STATSSA 2012]). This illustrates the importance if including informal income sources as well as subsistence activities.

Another issue is religiosity. Usually denominations are grouped into certain categories. These categories might not be the relevant ones for all areas within the country. A study that contains more detailed income data is the KwaZulu-Natal Income Dynamics Study (KIDS). This study, however, does not include Pentecostal-Charismatic Churches and the religious categories overlap: *African Independent Church* is one church category and *Zionist,* actually a subcategory of AIC, another. *Nazareth Church/Shembe*, also an AIC, is included as a separate category as well. This might create confusion among respondents and confound the results. Furthermore, traditional African religion is not included in the KIDS questionnaire. In the official South African censuses and surveys

done by StatsSA, African traditional belief is included. However, the number of people declaring to practice it is virtually zero (STATSSA 2004, 24). This might be due to the fact that no provision was made for the possibility of adherence to multiple religious groups. In the context of the geographical area of this study, it is not unusual for people to simultaneously practice African traditional religion while being church members.

4.1.2 Research area

Fetakgomo Municipality is one of five local municipalities in the Greater Sekhukhune District, located in the south-east of the Limpopo Province. It extends over an area of 1,105 square kilometers and has a population of 112,232 living in 21,851 households (STATSSA 2007, xiii). The climate is sub-tropical with rainfalls from October to April, albeit with high fluctuation of beginning of the rainfall season and the quantity (DRIMIE et al. 2009). Figures 1 and 2 give an impression of the climate (pictures taken in the winter) and vegetation of the area.

Figure 1: Fields and Hills near the Village of Ga-Nchabeleng

The entire Sekhukhune District is a poverty node in South Africa (ibid.), with 61 percent of the economically active population unemployed according to the 2007 Community Survey (STATSSA 2012). One central place (i.e., a place that provides administrative and economic functions to the surrounding areas, cf. CHRISTALLER [1933] 1968) is the village of Ga-Nkoana, where the municipal administration, the post office, a petrol station, and a small shopping center including a large Spar supermarket are located. Most of the municipality's inhabitants use this place for shopping. In the north of the municipality, where the Pronvincial road R37 runs through the municipality, the town of Burgersfort serves this function (except for municipal administration),

although it is located far outside the municipality. In the south east, the central place people use is the town of Jane Furse.

Figure 2: View of the Area near the Village of Mohlaletsi

The municipality was selected because of the following considerations: First, the entire municipality is classified as rural area (SDM 2012). Thus, differences between rural and urban areas influencing the results do not have to be accounted for. Furthermore, because of the fact that is it rural, migration into the area is low. The population is largely culturally homogeneous. Almost all people who live in the municipality are members of the BaPedi cultural group. In fact, only two of the 207 respondents in the survey were not mother tongue speakers of Northern Sotho. Second, under the Apartheid regime in South Africa, the entire municipality was part of the "self-governing" Lebowa homeland (BERGH 1999), one of ten areas within South Africa designated by the Apartheid government to be inhabited the black population. After the 1994 elections, provincial boundaries were changed and districts as well as municipalities were created as administrative units. Many of the municipalities include former homeland areas as well as former non-homeland areas. By selecting a municipality in which the historic institutional environment is the same for the entire area, possible influences of different historic institutions can be avoided. Third, Fetakgomo has a high religious plurality. Pentecostal Churches (AICs and PCCs) can be found there as well as mainline churches; traditional African religion is practiced and some people have no religious affiliation.

4.1.3 Survey Methodology

4.1.3.1 Preparatory Study

Prior to the survey, a preparatory study was conducted for two weeks in August 2011. It consisted of three phases: an introductory phase, a workshop phase, and a pre-survey.

In the first phase, permission of the local authorities to conduct research in the area was obtained. The municipal officers were very helpful and quickly provided a letter of permission we could show the interviewees when introducing ourselves (appendix 2). Later during the survey the necessity arose to obtain permission from the traditional leadership of the area. His excellency, King K.K. Sekhukhune, was so generous to grant such permission (appendix 3). Additionally, a number of informal/semi-structured interviews were conducted in order to gain familiarity with the local population and the economic and agricultural practices in the area.

In the second phase, two workshops with participants from the local population were conducted. In the organization we were assisted by two local ward councilors. The aim of the workshops was to gather information on what income sources people in Fetakgomo have, how agricultural production is done and what is produced by the households, and which religious groups exist in the municipality. I made use of the rapid rural appraisal (RRA) methodology based on ANYAEGBUNAM, MEFALOPULOS, and MOETSABI (2004) and SLE (1997). In particular, brainstorming, voting/ranking, and focus group discussions were used.

Figure 3: Group Discussion during the Workshop at Mafise Primary School

The workshops took place on 11 August 2011; the first one in the morning at Tshweele Primary School in the village of Ga-Masimela and the second one at Mafise Primary School in the village of Mabulela. These villages are located in two different areas of the municipality. The workshops were attended by 42 and about 50 people, respectively, and were conducted in Northern Sotho. After introducing myself, my field worker, and the content and aim of the research project, the three topics were discussed (See appendix 4 for the detailed

workshop agenda and the attendance registers). On the basis of the information gathered, the questionnaire was refined. Furthermore, the information was used on the one hand used as a benchmark to verify the plausibility of the information the interviewees provided. On the other hand, it was used as the basis for the imputation of values where this was necessary. In some cases, for example, the interviewees did not know exactly how much each household members made in monetary terms. This was often the case with informal economic activities. Where information on the kind of activities was available, I imputed the monthly income from that activity on the basis of the information from the workshops.

4.1.3.2 Main Study

The actual survey was conducted from 2 to 30 September 2011. During that time, household interviews were conducted every day of the week between 8h30 a.m. and 6h00 p.m., except for 3 days of break. In total 207 interviews were conducted in the 27 days, yielding an average number of 7.7 interviews per day. The duration of the interviews ranged between 15 and 60 minutes.

Household definition

STATSSA's (2010, 67) household definition was used in the survey: A household is "a group of persons who live together and provide themselves jointly with food and/or other essentials for living, or a single person who lives alone." A household member is "a person that resides with the household for at least four nights a week." The head of the household is defined by STATSSA as **"**the main decision-maker, or the person who owns or rents the dwelling, or the person who is the main breadwinner" (ibid., 66). This definition was not used, for in many cases, the owner of the dwelling or the main breadwinner is a migrant worker and thus spends less than four nights per week within the household. According to the above definition, he is thus not a household member. The definition of household head used was *the person who is responsible in this household* (Northern Sotho: *motho yo a rwalang maikarabelo mo lapeng le*). In the entirely rural Municipality of Fetakgomo, the household as a social group corresponds to a geographical unit. In almost all cases, one household inhabits one dwelling. This is illustrated by the Northern Sotho word for it, *lapa*. It can denote the family as well as the household, but also the house with the traditional courtyard. Traditionally, the *lapa* is the courtyard that is framed by a number of houses inhabited by one family (cf.

Figure 4: A Typical Lapa in Fetakgomo

figures 4). This coincidence of the social definition and the physical/geographical definition was made use of in the sampling process.

Data collection method

The survey design as well as the following paragraphs are based on UN (2005) and CARLETTO (1999). The data was collected in personal interviews conducted by me with the assistance of two field workers, each of whom accompanied me for two weeks of the survey. The method of personal interviews was chosen primarily because illiteracy rates are relatively high in Fetakgomo. According to the 2001 census (STATSSA 2004, 35), more than a third of the population aged 20 and older have received no schooling. Personal interviews have further advantages (UN 2005, 17): Interviewers can explain the purpose of the survey, motivate respondents to participate, answer potential questions, and explain conceptually difficult items in the questionnaire. Disadvantages of personal interviews are the possibility of an interviewer bias, suggesting answers to the respondents when probing, the influence of personal characteristics of the interviewer (such as age and gender), and the dual task of interviewing and writing at the same time.

Since I conducted all the interviews myself, the only source of a non-systematic error due to interviewer bias was the change in field workers. Both field workers were thoroughly briefed in order to minimize this possibility. At all times, both the field workers and I made sure the purpose of the study was explained the same way in all households. We paid careful attention not to suggest answers to respondents, particularly when there was a need to elaborate on items in the questionnaire.

Furthermore, we evaluated our behavior during the interviews time and again. However, a remainder of potential influence of the field workers' characteristics cannot be ruled out entirely. The first field worker, Sam Moifatswane, was a retired researcher of the Museum of National Cultural History in Pretoria aged 64, whereas the second one, Cosmo Mapitsa, was a university student at the age of 26. Especially in a cultural environment in which age is very often seen as the source of authority, the attitude towards these two people must have been different. The effect, however, cannot be considered substantial, since I was responsible of conducting the interview. Potential errors due to interviewing and writing at the same time were not so much an issue, since the field worker also looked at the questionnaire sheet while I conducted the interview and verified that I recorded the answers correctly.

Figure 5: Interviewing a Household Head and her Daughter

All interviews were conducted in Northern Sotho. In order to decrease error sources this was the case even in those instances where the interviewees were fluent in English. The field workers assisted me in situations where, in spite of thorough preparations, my own capabilities of Northern Sotho were insufficient either to phrase questions in a way that the interviewees could understand or to understand the interviewees' response. The latter was especially the case with elderly people who lacked teeth and whose pronunciation was difficult to understand, and with people who elaborated extensively on their answers.

Sampling

The universe of the survey are all households in Fetakgomo Municipality. The households were selected in a two-stage cluster sampling process (cf. UN 2005, 58–59). Due to the unavailability of a sampling frame, a geographical sampling approach was employed. A similar method was used by GARNER (2004a). The primary sampling units (clusters) are the subplaces according to the municipality map provided by StatsSA (see appendix 5). The geographical unit subplace usually corresponds to villages in rural areas. The secondary sampling units are the households. The sample frame was a satellite image of the municipality taken from Google Maps, in which all physical

households (*malapa)* are clearly visible (see figure 6). This satellite imagery of the municipality was taken between 2008 and 2011, hence the sampling frame is relatively up to date. The subplace delimitations were imported into Google Earth,[13] facilitating an unambiguous allocation of households to clusters. In the interest of simplifying the logistics of the survey, the list of subplaces taken from the StatsSA map was translated into a list of clusters with two modifications. First, if two geographically separated subplaces had the same name they were taken as different clusters and assigned a suffix according to their relative position (e.g., Mohlaletsi E/Mohlaletsi W). Second, in some instances clearly separable villages on the satellite imagery are not indicated as separate subplaces on the StatsSA map. Those were taken as separate clusters and named by adding a suffix to the name of the subplace they are located in (e.g., Baroka-Ba-Nkoana A, Baroka-Ba-Nkoana B). The total number of clusters which resulted was 61. Of these a sample of 30 was randomly selected with an equal probability of selection method. In the 30 clusters selected (see appendix 5), all houses on the satellite image were counted and numbered. The size of the clusters varies greatly, the smallest containing 25, the largest 2066 households.

Figure 6: Satellite Image of a Village in Fetakgomo

Errors in the sampling frame

The satellite image proved to be a surprisingly accurate sampling frame. Only in few cases were errors encountered while visiting the households. There were three types of errors. First, some houses were permanently uninhabited. In most cases this was either clearly visible because of the deteriorated state of the house – which was not visible on the satellite image – or we were told so by the neighbors. In some cases, this was not immediately clear. In such cases at least four re-visits were done at two different times of the day (morning/afternoon) and at least two different days, of which at least one was a weekday and at least one on a weekend. If there was no sign that the house was inhabited during any of those visits, the house was taken as permanently uninhabited.

[13] I wish to express my sincere gratitude to Mr. Julian Picht, Leibniz-Universität Hannover, who managed to do this.

Those houses were replaced by the next number house on the map and subtracted from the total number of houses. Second, in some villages we found newly built houses, which did not yet appear on the up to three year old satellite image. Those were added to the sampling frame and to the total number of houses. Third, some households that were numbered on the map did not correspond to households on the ground. This was, for example, due to multiple households sharing the same building, buildings of different households in close proximity of each other or spread out buildings of one household. The numbers on the map were corrected accordingly. After all corrections that were applied during the survey, the sample frame included 11,892 houses. This is roughly half the number of households in the municipality.

The households to be interviewed (secondary sampling unit) were selected through fixed rate sampling. Every 55th household was selected, starting with a computer generated number from 1 to 55. One exception was allowed to this rule: At least two households were selected in each cluster. Since some clusters are very small, the effective selection rate is slightly higher, about 1 in 54 households. In total, there are 221 households in the sample. Of these 221, in 207 cases interviews were conducted, yielding a response rate of 93.7 percent. In 10 households people refused to participate in the survey (non-response) and in 4 (permanently inhabited) households we did not manage to speak to the household head. Either there were only children there or no one, but the house showed clearly displayed signs of inhabitance, for example, washing that was hanging outside to dry. After the procedure of at least four re-visits outlined above those were counted as non-response as well (cf. UN 2005, 24).

4.1.3.3 Income Measurement

Most studies in developing countries use the value of household consumption instead of household income as DEATON (1997) points out. Nevertheless, in the survey used here preference was given to the collection of data on income. There are two reasons for this. First, collecting consumption data necessitates very long questionnaires and is thus much more time consuming (DEATON 1997, 27). Each households' income generating activities are limited to very few, while consumption needs to take into account a large variety of items or categories of items that need to be inquired in the interview. Second, when admitting the possibility of savings, from a theoretical point of view income is a much better indicator of economic success than consumption. In particular, the income

sources included in the questionnaire were agricultural production, formal income (after taxes), informal income, social grants and pensions, and remittances. The households command over exact information on their formal income and the social grants and pensions they receive. For remittances although subject to some fluctuations, the same is true. With respect to income from informal economic activities, such as building or running a small shop, exact information is not as readily available.

Two of the major disadvantages of income measurement mentioned by DEATON (1997, 29–32) were found not to be very severe during the pre-study. The first one is the lack of bookkeeping of small vendors. Women selling sweets in front of the school (quite a frequent income generating activity among women in Fetakgomo), for example, knew very well how much money they take home each week after deducting input costs. The second potential problem is that one's income is highly sensitive information and the interviewees might therefore be reluctant to disclose it or be likely to understate it. It seemed, however, that most people did not have too much of a problem with the disclosure of their income, even if other people (relatives or neighbors) were present. One reason for this which was pointed out to me by my field worker is that in small rural villages information on one's income generating activities and their earnings is quite hard to be kept secret and hence already quite public information in the village. We did, however, encounter households where we had a reason to suspect that people misstated their finances. The starkest example of this is a family of eight members, four at working age, who evidently used part of their disposable monthly income of R 280 (ca. EUR 28) to pay for a satellite TV subscription which costs at least R 200. Where we had reason to believe that we were given incorrect information the questionnaire was marked. Those cases are excluded from the econometric analysis.

One problem common to measuring income and consumption alike is the value of the household's autoconsommation, that is, production by the household for its own consumption. Especially in developing societies, where a large part of economic production and transactions does not go through monetary or formal markets, it is important to take the value of the autoconsommation into account. Low-income households typically spend a large share of their income on food. The production of food by the household substantially increases its disposable income. Therefore its value should be taken into account. To illustrate this point, consider two identical households, each with a monetary income of R 500. One is involved in vegetable production on its

yard and the other one not, all other things equal. I would argue that the one engaging in vegetable production is economically more successful. Hence, the value of subsistence agriculture is included in the household's income. This is by no means an easy task as also DEATON (1995, 1800) points out. Subsistence farmers normally do not keep records and the production is not sold (CONRADIE 2011). It is difficult, for example, to evaluate the monetary income equivalent of two tomato plants or to decide what value is to be imputed for the ownership of two goats or the bundle of wood gathered in the hills that is used for cooking. First of all, the imputation of subsistence production to household income requires a decision on which activities to include (DEATON 1995, 1800). A home grown bundle of spinach, for example, is easily valuable and has a direct market substitute (a bundle of spinach from the store). When it comes to services by the household, which are part of household production as outlined above, it gets more difficult: cooking, washing, and watching the children could theoretically be services purchased in the market. Should those services be included? According to DEATON the decision to include home produced goods but not home produced services is arbitrary. Nonetheless, I follow the mainstream of studies in imputing subsistence production to income, but not household services. Firstly, household services are even more difficult to value than subsistence produce and second, home grown food is a direct substitute of market purchased food, whereas the substitutability between household services such as washing and the alternative of a washing machine is not so immediate. Since all but a few households stated that their agricultural produce is either entirely or for the most part consumed within the household, I follow CHIBNIK's (1978) recommendation to value subsistence produce at its retail price. This is also a consequence of the theoretical framework outlined in section 3.

4.1.3.4 Imputation Procedure of Agricultural Production

The imputation of income to subsistence production activities was done according to the procedures outlined below. In general, missing values were replaced with the mean of the other observations. If, for example, the number of acres was specified and the crop grown on them, but not how much was harvested, the missing values were interpolated by the average yield per acre across all observations for the respective crop. It is appropriate to discuss three the assumptions underlying the imputation procedure. First, where only the data on the area under cultivation (e.g., in the case of small field in the yard, vegetables, and trees) or the frequency of a certain agricultural activity (e.g., to

gather wood) was available, productivity was assumed to be the same for all households. Second, the goods are assumed to be homogeneous and thus can be priced at the same prices for all households. This means for example, the cattle bred by one household has the same size and properties as the cattle bred by another household and they thus yield the same price. Third, as already discussed in chapter 3, prices are assumed to be the same for all household regardless of their physical location. Of these assumptions, the first one is perhaps the most unrealistic one. However, since all households are located within relative geographic proximity, vegetation and soil quality can be assumed to be roughly the same. Moreover, the severest limitation is due to lack of water and this applies to the entire municipality. Hence, since the agricultural conditions are the same for all, productivity should not vary substantially. The important difference is between those households engaged in the respective agricultural activity and those that are not – those who engage in agriculture as additional livelihood strategy and those who do not. Compared to that, the differences within a certain agricultural activity are relatively small. The same argument applies to the second assumption. Prices of livestock given during the survey, for example, fluctuated around their mean within a ten to fifteen percent margin. Of course, one cow might be bigger than another, but the important difference is between those who sell cows and those who do not. Furthermore, the use of the mean value reduces variations due to over- or understatement of prices. The third assumption is justified by the close proximity of the households. The law of one price can be assumed to hold within one small municipality. In the subsequent paragraphs, the respective valuation procedures of agricultural production are outlined.

Field Crops

Field crops are either grown in fields outside the village (figure 7) or in small fields in the household's yard (figure 8). They are grown during the summer while there is rainfall. Planting is done in October/November and harvest takes place in March/April. As became clear in the workshops as well as in the pre-survey, field crops are normally grown in intercropping, that is, multiple crops are grown in the same field at the same time. The most important field crops are sorghum (*mabele*) and maize (*mahea*). Normally sorghum or maize are intercropped with beans (*dinawa*), pumpkin (*marotse*), and watermelons (*magapu*). While most of those households engaged in agricultural activities were able to give the average number of 80 kg bags of sorghum and the

Figure 7: Field Outside a Village

quantity of beans they harvest per season, the quantity of pumpkin or watermelon is not measured. As one farmer put it, “it can be a whole donkey cart full of watermelons.” Needless to say that donkey carts are not standardized in capacity. As far as the size of the fields is concerned, those engaged in field crop production were well able to tell how many acres they had under cultivation. Although field size varies to a certain extent, it was assumed that each field has the size of an acre of 4047 square meters (*akere*) unless the respondents specifically stated the size in hectare or South African morgen (*mmorogo*) of 8565 square meters. Figure 7 shows a typical example of a field outside of a village. These fields are not fenced and hence there is usually a loss of part of the harvest due to straying animals.

Due to the limitations of data on quantities, field crops grown outside the village were valued as follows. For sorghum, maize, and beans, quantities were available. They were priced at the average of all prices given by the respondents for the respective crop. For watermelon and pumpkin the procedure is slightly different. Since no yield data was available, it was assumed that the per acre yield is 15 watermelons and 15 pumpkins. This value is an estimate based on the workshops and informal discussions after the interviews and takes into consideration that these crops grow between the main crop sorghum or maize. In the valuation of crops grown in the fields, intercrops are included only if specifically mentioned by the respondent. From the value of the harvest, input costs are subtracted. A tractor or donkey has to be rented for ploughing, unless either is owned, and the grain has to be ground. Table 2 gives an overview over the prices of field crops in input costs imputed.

Crop	Unit of measurement	Value imputed	Source of price information
sorghum	80 kg bag	R 425.00	average from survey and workshops
maize	80 kg bag	R 250.00	average from survey and workshops
beans	1 kg	R 10.50	average from survey
watermelon	piece	R 15.00	estimate based on workshops and interviews
pumpkin	piece	R 5.00	estimate based on workshops and interviews
ploughing	depends on field size and shape; individual responses used		
grinding	1 kg	R 1.13	average from survey

Table 2: Valuation of Field Crop Production

To illustrate this by way of example, household #116 of the survey cultivates four acres of land. It harvests 11.5 bags of sorghum, which are valued at R 425, totaling R 4887.50. Additionally, beans, watermelons, and pumpkin are grown, but the amount harvested is not specified. Based on the average per acre yield of beans, it is assumed that $4 \cdot 26.83\,\text{kg} = 107.32\,\text{kg}$ are harvested. The value of beans would then be R 1126.86. The quantity of watermelons and pumpkins assumed to be harvested per acre is 15. Hence, the value of watermelons is $4 \cdot 15 \cdot \text{R}\,15 = \text{R}\,900$ and the value of pumpkins is $4 \cdot 15 \cdot \text{R}\,5 = \text{R}\,300$. From the sum, plough costs of R 400 and grinding costs of $80 \cdot 11.5 \cdot \text{R}\,1.13 = \text{R}\,1040$ were subtracted. The profits from the household's field crop production are therefore:

	R 4887.50	value of sorghum
+	R 1126.86	value of beans
+	R 900.00	values of watermelon
+	R 300.00	value of pumpkin
–	R 400.00	costs of ploughing
–	R 1040.00	costs of grinding
=	R 5774.36	Annual profits

Figure 8: Small Field Inside a Household's Yard

For field crops in a household's yard, a different valuation procedure was employed due to the following considerations. First, these fields are much smaller, located very close to the household, and mostly inside fenced yards. On the one hand, the crop production is thus more intensive and on the other hand, harvest loss due to strolling animals and birds is lower. Second, we were able to measure the size of these small fields. Harvest quantities were unavailable in almost all cases, since the quantities are small and often consumed immediately. Here a lump-sum value of R 2.13 for each square meter of field was imputed. The basic assumption is that such small fields in the yard can be standardized. In particular, it is assumed that sorghum is grown along with beans, watermelons and some pumpkins and that the yield is given by the commercial yield of the respective crop multiplied by a subsistence factor (<1) and the price of the crop. The use of the values of commercial yield scaled down by a subsistence was necessary since data on yields from subsistence agriculture is unavailable. The data on the commercial yield was provided by the South African Department of Agriculture, Forestry and Fisheries (DAFF 2012; cf. appendix 6). Since, according to DAFF 2012, subsistence yields are at least 30 percent lower than commercial yields, a subsistence factor of 0.5 was chosen for the main crop; for the intercrops a factor of 0.1 was applied. Table 3 gives an overview over the values.

Crop	Commercial yield per m²	Subsistence factor	Yield subsistence farming in per m²	Value imputed per kg	Profit per m²	Source of price information
sorghum	0.23 kg	0.5	0.115 kg	R 7.60	R 0.87	local Spar shop
bean	0.15 kg	0.1	0.015 kg	R 10.50	R 0.16	see table 2
watermelon	3 kg	0.1	0.3 kg	R 2.00	R 0.60	estimate
pumpkin	2.5 kg	0.1	0.25 kg	R 2.00	R 0.50	estimate
				Sum	R 2.13	

Table 3: Valuation of Small Fields in the Yard

Vegetables and Fruits

Vegetables are cultivated year round in small manually irrigated gardens in the yards (cf. figure 9). Contrary to field crops, vegetables are planted separately, not intermixed. The most commonly grown vegetables are beetroot, butternut, cabbage, carrots, hot pepper, onion, spinach, sweet potato, and tomato. Again, in most cases data on yields was unavailable, since the households only produce for autoconsommation. The respondents were not able to specify, not even approximately, the quantity of tomatoes, spinach, or potatoes they harvested. An exception are a few households that sell at least part of the vegetables they grow, but that was the case in only four households. A similar

procedure to the valuation of the small fields was employed for vegetable production. The area used for the respective vegetable was clearly visible in the garden and we measured it. Also for vegetables, commercial yields were scaled down by a subsistence factor of 0.5 and used as the values for yield per area. Information on the length of the growth period was obtained from the DAFF website (DAFF 2012) as well as through visits to agricultural projects in the area. Unfortunately, these projects do not keep records in a way that allows an easy calculation of average square meter yields. Otherwise this would have been a good opportunity to obtain such data and avoid the use of commercial data. The vegetable prices used are prices at the local Spar supermarket and prices of direct sales at the agricultural projects. No input costs were deduced since neither ploughing nor grinding is necessary and it is assumed that the cost of seeds are negligible. Table 4 contains the pricing information for vegetables.

Figure 9: Example of a Vegetable Garden

Crop	Commer-cial yield per harvest	Length of growth period	Harvests per year	Annual commercial yield per m²	Subsis-tence factor	Yield subsistence farming per m²	Value imputed per kg	Annual profit per m²
beetroot	3 kg	3 months	3.5	10.5 kg	0.5	5.25 kg	R 10.00	R 52.50
butternut	2 kg	6 months	2	4 kg		2 kg	R 7.50	R 15.00
cabbage	7.5 kg	5 months	2.4	18 kg		9 kg	R 5.00	R 45.00
carrots	2.5 kg	4 months	3	7.5 kg		3.75 kg	R 4.80	R 18.00
hot pepper	0.5 kg	5 months	2.4	1.2 kg		0.6 kg	R 29.00	R 17.40
onion	3 kg	4 months	3	9 kg		4.5 kg	R 3.20	R 14.40
spinach	1.7 kg	8 months	1.5	2.55 kg		1.275 kg	R 20.00	R 25.50
sweet potato	7 kg	6 months	2	14 kg		7 kg	R 6.00	R 42.00
tomato	6 kg	5 months	2.4	14.4 kg		7.2 kg	R 8.00	R 57.60

Table 4: Valuation of Vegetable Production

Example: Household #62 plants onions on 0.5 square meter and spinach on 0.5 square meters. The resultant profit from vegetable production that is imputed is given by $0.5 \cdot \text{R}\,14.40 + 0.5 \cdot \text{R}\,25.50 = \text{R}\,19.95$.

Fruit trees in household yards (cf. figure 10) are avocado, lemon, mango, morula, mulberry, orange, and papaya. Grapes are counted as fruit trees as well. In the interest of simplicity and to save time during the interviews, we did not differentiate between trees, but rather counted the total number of trees. Like vegetables, fruits are consumed directly and not sold. Therefore we found it impossible to obtain any detailed information on the yields of fruit trees of the households. Some information could be obtained from informal discussions with survey participants. On the basis of commercial per hectare yields, a yield estimate per tree was computed for avocado, papaya, and orange trees. Because water is scarce for most of the year and the trees are not irrigated, a factor of 0.1 was used for the conversion to subsistence yields. The resultant yield estimate was priced at retail prices at the local Spar supermarket and the informal markets at pension pay-out points. No input costs were subtracted. The mean of the annual profits of avocado, papaya, and orange trees was taken as proxy for the annual profit from all trees.

Figure 10: Fruit Trees in a Household's Yard

Fruit	Annual commercial yield per ha	Subsistence factor	Annual subsis-tence farming yield per ha	Number of trees per ha (in commercial agriculture)	Subsistence farming yield per tree	Price per kg	Annual profit per tree
orange	32500 kg	0.1	3250 kg	204	15.9 kg	R 2.00	R 31.86
avocado	15500 kg		1550 kg	204	7.6 kg	R 7.00	R 53.19
papaya	26250 kg		2625 kg	2000	1.3 kg	R 11.00	R 14.44
						Mean	**R 33.16**

Table 5: Valuation of Fruit Trees

Example: Household #72 has 8 trees, therefore an annual income of $8 \cdot \text{R}\,33.16$ is imputed.

Livestock

The types of livestock kept by households in Fetakgomo are cattle, chickens, donkeys, goats, and sheep. Livestock was valued on the basis of the prices given in the workshops; livestock products were valued according to the retail price at the local supermarket. If information was available on how many of the respective animals were sold per year, these values were used. If only the number of animals was available, the mean value of animals sold per animals owned across all livestock owners was used to interpolate. Donkeys were not valued since they are used by the household for income-generating activities such as ploughing other people's fields. Their use value was included in the income from the respective activity. Livestock grazes in the fields around the village and no fodder is bought. However, sometimes herd boys are employed to watch the animals, for which labor input costs are subtracted. Table 6 shows the prices used.

Animal / animal product	Value imputed	Source of price Information
cattle	R 6000.00	workshop
chicken	R 700.00	workshop
goat	R 600.00	workshop
sheep	R 45.00	workshop
goat/cow milk	R 6.30 per liter	Spar supermarket
eggs	R 0.95 per egg	Spar supermarket

Table 6: Valuation of Livestock Production

Example: Household #94 owns 10 cattle, 20 goats, and 5 chickens. On average, the household sells one cattle per year and slaughters two for home consumption. It sells 7 goats in a year and slaughters 48 chickens. The number of eggs collected on average per day is 1.125. The family employs a herd boy whom it pays R 700.00 per month. The total profit, hence, is given by the following calculation:

	R 18000.00	value of cattle sold or consumed
+	R 4900.00	value of goats sold
+	R 2160.00	values of chickens consumed
+	R 390.09	value of eggs consumed
–	R 8400.00	labor costs
=	R 17050.09	sum annual profit from livestock

Figure 11: Livestock: a Cattle Herd Resting in the Shade of a Tree

Figure 12: Livestock: a Herd of Goats Crossing the Street

Wood

Furthermore, income was imputed for the wood gathered that is used for cooking and heating. Wood is normally gathered by the women. It is carried on their head or transported using a wheelbarrow. The value imputed for a bundle (*lengata*) was R 12.00, for a wheelbarrow load R 24.00. This was multiplied by the monthly frequency the women went to gather wood and how many of them gathered it. A number of households gathered wood in order to sell it. This was counted towards income generating activities.

4.1.4 Religiosity in Fetakgomo

The part of the questionnaire on religiosity included the following questions:

Do you attend church?

If yes, which church do you attend?

How long have you been a member of that church?

How often do you attend services at that church?

How often do you attend other activities of that church?

How often do you pray?

Additionally, it contained a question relating to African traditional religious practice – namely, if the respondent makes sacrifices to the ancestral spirits (*go phasa*). As was pointed out to me by it is the subject of an ongoing debate whether this practice can really be called religion or is rather an element of cultural practices.[14] However, to bring sacrifices to the ancestral spirits constitutes a shared set of activities premised upon faith in supernatural forces and hence falls into the definition of religion outlined in section 3.1. The questions on church and traditional religion were asked separately and are not mutually exclusive. Respondents could be church members and practice traditional religion as well.

While the first three questions are relatively unambiguous and yielded good results, we found the last three not to work well. In particular, people gave standardized responses that are more likely to reflect the prescription of the church than individual practices. For example, a frequent response to the question “how often do you attend services?” was “three times a day, in the morning, at noon, and in the evening.” Therefore, the variables derived from the responses to these questions are not used in the econometric analysis but only presented in the descriptive statistics section of this chapter.

In total 43 different church names were given in response to the question on church membership. In cases where it was unclear what kind of a church the named church was, we probed for the type of the church (open question). This was not done for the mainline churches (Catholic, Lutheran, Methodist, Reformed) and for the two large Zionist Churches (Zion Christian Church, St. Engenas Zion Christian Church), which can be unambiguously identified and are well documented. Named church categories were Apostolic, Pentecostal-Charismatic (*Bazalwane*), and Zionist. Some respondents did not even provide a church name in the first place, but merely named the category. It is an appropriate assumption that the local categorization of churches corresponds to the perception of these churches by the people in Fetakgomo. If a church is categorized as Apostolic it has more in common with other churches in the same category than a

[14] I thank the participants of the summer school “Social Impact of Christian Communities” for drawing my attention to this.

church categorized as Zionist. What exactly the distinctive features of the respective categories – as perceived locally – are, reaches beyond the scope of this study. The local categorization of churches forms the basis of the categorization employed here, since it will be a categorization based on criteria relevant to their social, cultural and physical environment. By employing entirely different categories we might use criteria which are not relevant to the people at local level or, as ANDERSON (2000, 39) points out, "so emphasise the differences that it will go beyond that recognized by the church members themselves." Nonetheless, in order to provide a theoretical frame of reference, in the following a brief overview over the categorizations in the literature is given.

StatsSA categorizes churches in South Africa into *AIC*, *Pentecostal/Charismatic*, *Mainline Christian*, and *Other Christian* (STATSSA 2004, 24). As outlined in section 2.1, the first two categories are Pentecostal Churches in the broad sense. These categories are largely undisputed and will be briefly discussed below. Further differentiation, however, is necessary within AICs since 100 of 129 respondents (77,52%) of all church members in the survey are members of churches that belong to this group.

The oldest and perhaps most influential classification of AICs is the one by SUNDKLER (1961; cf. Anderson 2000, 38–40). In his "groundbreaking work" (ANDERSON 2000, 34) on AICs he distinguishes between the *Ethiopian* type and the *Zionist* type. Zionist Churches have their roots in the early 20th century north American Pentecostal movement. Their theology places a strong focus on the holy spirit and common characteristics are healing, speaking in tongues and strict rules. Furthermore, AICs include elements of traditional African religion (SUNDKLER 1961, 54f; VENTER 2004a). Ethiopian Churches[15] are those that "seceded from White Mission Churches chiefly on racial grounds" primarily during the end of the 19th century or secessions of such churches. They largely resemble the churches they split from in structure and theology, but emphasize black leadership (SUNDKLER 1961, 53–54; VENTER 2004a). Ethiopian churches have strong "antiracist tendencies" (Venter 2004a) that are strongly linked to segregation and the exclusion of black people from leadership in the churches. Although SUNDKLER's categories are the basis of many present categorizations (ANDERSON 2000,

[15] The name "Ethiopian" does not necessarily relate to the East African state, but is a self-assigned name of those churches, taken from the biblical reference to Ethiopia. Missionaries saw this as a "promise of the evangelization of Africa" (Sundkler 1961,39) and the early leaders of Ethiopian Churches in turn interpreted it as independent African Churches under African leaders.

34) and still used in the literature, for example, by ANDERSON (2000, 38–40) and VENTER (2004a), they are not appropriate in the context of this study. After the end of Apartheid and the continuous disaggregation of racial segregation in the churches and society as a whole, the political agenda of Ethiopian Churches became much less relevant. More important, only two respondents specified to be members of churches that ANDERSON (1992, 126) classifies as Ethiopian, the Revival Catholic Church (RCC) and the African Methodist Episcopal Church (AME). In the case of the RCC, however, probing for the category led to the respondent classifying the church as Zionist. The AME, which also STATSSA (2001, 16) classifies under *Ethiopian-Type churches* in the census 2001 code list, is – strictly speaking – a mission church (SUNDKLER 1961, 54). It was brought to South Africa by black Americans, who, as SUNDKLER (ibid., 42) points out, were "as much foreigners and strangers in the eyes of the Ethiopians as the White missionaries." Moreover, the church is Methodist in theology (AME 2012) and thus rather has a proximity to the Methodist church, which is classified as mainline. Therefore the category *Ethiopian* is not used here and the AME grouped into the category of mainline churches.

ANDERSON emphasizes the relation of the AICs with the global Pentecostal movement (ANDERSON 2000; cf. VENTER 2004a) and distinguishes six different categories (ANDERSON 1992, 64–72): *Pentecostal Mission Churches*, which are "classical Pentecostal" churches initiated by White missionaries, and *Independent Pentecostal Churches*, initiated and run by Blacks. The AICs are grouped into *Indigenous Pentecostal-type* and *Indigenous Ethiopian-type Churches*, which largely resembles SUNDKLER's distinction. Additionally, he distinguishes *African Independent Baptist* and *Mission Churches.* The latter correspond to the Mainline Churches. This categorization misses the distinction between Zionist and Apostolic Churches, which is apparently important to the people in Fetakgomo. Furthermore, to allocate the churches encountered in my survey to the Anderson categories would prove close to impossible. Only 16 of 43 churches can be matched unambiguously to ANDERSON's (1992) Shoshanguve church list.

Zionist and Apostolic Churches	Pentecostal-Charismatic Churches
adult baptism by immersion	
no formal theological position	
fundamentalist approach to the Bible	
abstinence from tobacco and alcohol	
emphasis on the working of the spirit (perhaps less in Zionist and Apostolic Churches)	
belief in divine healing and prophecy	
exuberant worship services	
ambivalent attitude to traditional religious practices	opposed to traditional religious practices
wearing of uniforms	no uniforms
use of symbolic objects (holy water, ropes, ashes)	reject use of symbolic objects
some allow polygamy	no polygamy
sometimes speaking in tongues, but not emphasized	importance of speaking in tongues
salvation in “here and now” terms (deliverance from evil and sickness)	strong belief in salvation experience (being “born again”)
importance of bishops and prophets	
no consumption of pork	
worship often takes place in the open	
indigenization of Christianity	

Table 7: Comparison African Independent Churches – Pentecostal Charismatic Churches

According to VENTER's (2004a) review of the literature, a categorization of AICs into *Ethiopian*, *Zionist* and *(Zionist-)Apostolic Churches* is most commonly used. In addition to these three, a fourth category, *Messianic*, is proposed by some scholars (ibid., 22). However, like *Ethiopian*, a *Messianic* category was not mentioned by any respondent during the survey. Hence, it is not employed. This leaves us with four categories: Mainline Churches, Pentecostal-Charismatic Churches, Zionist Churches, Apostolic Churches, and other churches. Mainline Churches are those that were started by European or North American missionaries and still retain connections to their mother churches, which they resemble to a large extent in structure and theology. Pentecostal-Charismatics, Zionists, and Apostolics are all Pentecostal Churches; Zionist and Apostolic Churches are AICs. PCCs and Zionists/Apostolics share some characteristics, but differ on others. Based on ANDERSON (2000, Ch. 1), table 7 provides a short and schematic overview.

The category Zionist contains only the two large Zion Christian Churches, which have common roots but split up over a leadership quarrel in 1948. In the econometric analysis, they are used as separate categories due to their large membership numbers. Other churches are allocated to the category other. Table 8 lists the churches

encountered in Fetakgomo and their allocation to the respective categories. Question marks indicate that identification of the church with a church in ANDERSON's (1992) list is questionable.

Category	Frequency	Church Name	Corresponding Church in Anderson (1992)	Frequency
Apostolic	26 (23)	Apostolic	?	2
		Apostolic Brethren Church of SA	Apostolic Christian Brethren Church?	1
		Apostolic Christian Church	Apostolic Christian Church in Zion?	3
		Apostolic Church	Apostolic Church	3
		Apostolist Church	?	1
		Bethesda Apostolic	Bethesda Apostolic Church	1
		Breathren Apostolic Church	New Apostolic Brethren Church?	1
		Brother Apostolic Church	Brother Apostolic Church in SA	1
		Church of Jerusalem (Apostolic)	Jerusalem Apostolic Church?	1
		Faith Mission Apostol	Faith Mission Jerusalem Apostolic Church in Zion?	1
		Full Gospel Independent Church of Sabath (Apostolic)	?	1
		General Pull Together (Apostolic)	General Apostolic Church?	1
		General United Apostolic Church	General Apostolic Church?	1
		Immanuel Apostolic Church	Emmanuel Apostolic Church	1
		Jerusalem Apostolic Church	Jerusalem Apostolic Church	1
		Members Apostolic Church of South Africa	?	1
		Orlet Apostolic Christian Church	?	1
		Saviour Department Apostolic Church	Department Apostolic Church of SA?	1
		St. John Apostolic Faith Mission	St. John Apostolic Faith Mission	2
		Zion Apostolic Church	Zion Apostolic Church of SA	1
PCC (*Bazalwane*)	16 (15)	Alliance Church (Bazalwane)	?	3
		Assemblies of God (Bazalwane)	Assemblies of God	2
		Bazalwane	?	3
		Ebenezer (Pentecostal) Church	?	1
		International Assemblies of God	International Assemblies of God	2
		International Church of South Africa (Bazalwane)	?	1
		Philadelphia (Bazalwane)	Philadelphia Church	1
		Universal Church Assemblies of God	Assemblies of God?	1
		Upon the Rock Ministries (Pentecostal)	?	1
		Ebenezer Christian Church	?	1
Mainline	12 (9)	AME African Methodist Episcopal Church	African Methodist Episcopal Church	1
		Catholic	Catholic	2
		Lutheran	Lutheran	2
		Methodist	Methodist	5
		Reformed	Reformed	2
Other	6 (5)	IPC International Pentecostal Church	International Pentecostal Church	4
		RCC Revival Catholic Church (Zionist)	Revival Catholic Church	1
		True Church of God	?	1
Zionist	69 (59)	St. Engenas ZCC	St. Engenas ZCC	31
		ZCC	ZCC	38

Table 8: Churches Encountered in Fetakgomo Municipality (all 207 observations used; the respective number observations in the high reliability data set [N=180] in parentheses)

4.2 Descriptive Statistics

The subsequently presented statistics are based on the 180 reliable observations since

only those are used later on in the econometric analysis.

4.2.1 Demographics, Household Income, and Income Sources

The average household in the data set is composed of 4.8 persons. This corresponds to the official data that records an average household size of 4.9 persons in the 2001 Census and 5.1 in the 2007 Community Survey (STATSSA 2009, 8). The smallest household in the data set consists of one person, the largest of 15. The average age of the household head is 54.7 years, with the youngest being 21 years old and the oldest 101. The households have a monthly income ranging from R 305 to R 32,735 with the mean at R 4,356 (calculated from the information outlined in section 4.1.3.3 and 4.1.3.4). This is a striking result in the light of the fact that according to the 2005/2006 Income and Expenditure Survey (STATSSA 2008, 9) overall average income in South Africa was R 74,589. This figure is twice as high as the highest income among the participants of my survey and 17 times the average. The income distribution is displayed in Figure 13. The majority of the households (76%) has a monthly income below R 5,000.

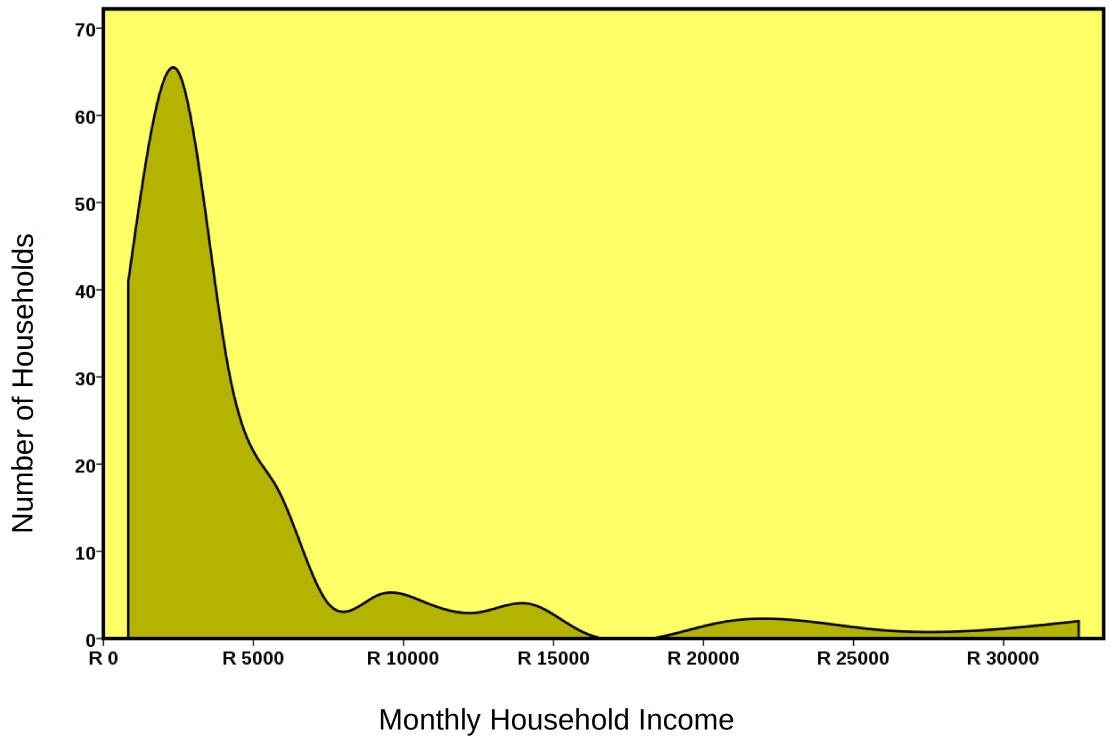

Figure 13: Income Distribution among Households in the Data Set (N=180)

The overview over the different income sources mentioned by the survey respondents (table 9) yields a number of interesting insights. First, by the number of households

engaged in them, agricultural activities are the most important income source in the data set. 170 out of 180 households are engaged in some form of agricultural activity. The single most widely spread activity within agriculture is to gather wood – which on average yields an equivalent of R 137 to the household. Agriculture is followed by social grants (old age, disability, and child grants but also grant type support like free basic electricity) and informal income-generating activities (e.g., piece jobs and small businesses). Roughly half the households receive remittances, and only in a little more than a fifth of all households at least one person has a formal income.

Income source	House-holds engaged in the activity	Monthly monetary income (agriculture: imputed income)		
		Mean	Minimum	Maximum
field crop production (fields or in the yard)	74	R 146.36	R -66.70	R 1,036.40
vegetable production	52	R 98.20	R 1.20	R 1,750.00
livestock production	96	R 390.68	R -316.70	R 4,366.60
ownership of truit trees	100	R 24.35	R 2.80	R 196.20
gathering wood	124	R 137.13	R 13.00	R 364.00
all agriculture	170	R 428.71	R -3.90	R 4,411.00
formal income (excluding social grants)	42	R 8,084.69	R 600.00	R 32,400.00
informal income	95	R 1,190.29	R 1.00	R 8,000.00
remittances	71	R 817.85	R 50.00	R 3,000.00
social grants	141	R 1,417.00	R 260.00	R 3,940.00

Table 9: Income Sources

Second, looking at the average income the different income sources yield, formal income is by far the most important income source, yielding an average of R 8,085 to the households. The second in line are social grants, though the average is only little more than a sixth of the average formal income. It is noteworthy that both in terms of the number of households drawing on them as well as the average income it yields to the households, social grants are the second most important income source. Informal income is almost as important in terms of the average income it yields. Remittances are fourth in the ranking and agriculture is last. Here two single agricultural activities – field crop and livestock production – even yield a negative income to the household. This result is in line with the LOW model presented in chapter 3. The households value the goods produced in subsistence agriculture not only by their monetary returns but also by other utility-yielding characteristics. In the case of field crop production this can be the sorghum needed to brew traditional beer or the prestige of cattle ownership. Agriculture does not have high monetary returns to the households. From this point of

view, the assumption of constant productivity made above is justified. Differences in agricultural productivity would not change the overall income situation much.

4.2.2 Church Membership Profiles

Comparing the households whose heads attend different churches using the data on household demographics, income and religiosity allows us to form profiles of the membership of the respective churches. Table 10 provides an overview.

The Apostolic Churches, of which in total 20 different ones were mentioned by respondents, have the lowest average household income among their membership. It is 30 percent lower than average household income. Their members are slightly older than in other churches, but educational levels are close to the average in the data. Membership in other groups as well as the indicator of relation to the chief are highest of all churches. Furthermore, the percentage of women is less than in other churches.

The average members of PCCs have a higher household income and are seven years younger than average church members in general. This is consistent with the idea that they particularly appeal to upwardly mobile young people. The share of women is above average, so is education. There seems to be less relation to the traditional authorities. Although the difference in age to the average is only seven years, the duration of church membership is 12 years lower.

Membership duration is by far the highest in Mainline Churches – 52 years on average. Moreover, members of mainline churches have more than double and by far the highest household income. They are also the most educated. They have few relations with the chief, but are active in local groups. Their religious involvement, however, is the lowest of all churches, both with respect to service and with respect to other church activities. Average weekly prayer is low as well. Mainline Churches are the only category that does not fall into the broad definition of Pentecostal Churches. The data seems to support the hypothesis that Pentecostal Churches foster higher levels of religiosity. My data on this point, however, is weak, since the religiosity questions did not yield good results and there are only 9 observations from Mainline Churches.

	Number of obser-vations	Average household Income	Average age	Percentage of women	Average Number of school years completed	Average tertiary education (1=learnership 2=college/ university)	Average membership in other groups	Average relation to the chief (from 0=no relation to 4=chief him-/herself)	Average years of church member-ship	Average church service attendance	Average weekly atten-dance of church activities (other than services)	Average weekly prayer frequency
all obser-vations	180	R 4,356	55	64%	5.76	0.19	1.40	0.56	not applicable			
Apostolic Churches	23	R 3,006	58	61%	5.78	0.13	1.78	0.83	33	1.52	0.57	13.09
Pentecostal-Charismatic Churches	15	R 5,078	45	80%	7.60	0.40	1.47	0.33	14	1.65	1.06	12.83
Mainline Churches	9	R 10,718	57	67%	9.33	0.89	1.78	0.22	52	1.08	0.47	12.37
Zion Christian Church	36	R 4,216	50	86%	6.08	0.17	1.31	0.72	23	1.78	1.28	14.44
St. Engenas Zion Christian Church	23	R 3,264	55	61%	5.61	0.13	1.22	0.48	23	2.38	1.00	12.75
other churches	5	R 4,285	49	80%	7.40	0.00	2.20	0.20	19	1.20	0.80	8.80
all churches	111	R 4,415	52	73%	6.45	0.23	1.49	0.58	26	1.75	0.96	13.17
household heads practicing African traditional religion	79	R 4,958	58	53%	4.77	0.15	1.37	0.59	not applicable			

Table 10: Church Membership Profiles

Since the two large Zionist Churches, ZCC and St. Engenas ZCC, have a comparatively large membership in the data set (69 out of 111 church members), they will be treated as separate categories. Interestingly, they have one thing in common. Their members' involvement in other groups is relatively low. The ZCC has the largest membership among survey participants. Income and education are close to the average; the percentage of women in this church is the highest in the data set. Members of the ZCC reported the highest prayer frequency – on average more than twice per day. The St. Engenas ZCC sticks out with average service attendance that is more than a third higher than the average. In terms of income and of the percentage of women it ranks low, near the Apostolic Churches. With respect to the other variables, it is close to the average.

As described above, church membership and the practice of African traditional religion is not mutually exclusive. Effectively, however, the two variables are negatively correlated with a correlation coefficient of -0.64. To illustrate this, 21 of the 111 church members practice traditional religion, and 58 of 79 household heads practice traditional religion but are not members of a church (11 are neither). Those who practice traditional religion have a higher than average income, close to that of the PCC members. The share of women is lower than in the churches and close to fifty percent. Whereas the churches seem to be predominantly female attended, traditional religion seems to appeal to both sexes alike. Education is lower than in churches, school education even one year less than in the Apostolic Churches. Together with Mainline and Apostolic Churches, those who practice traditional religion are among the oldest. Average group membership is slightly lower than among church members. As far as the relation to the tribal authorities is concerned, traditional religion does not entail a closer relationship.

The churches can be categorized in Apostolic, Pentecostal-Charismatic, Mainline, Zionist, and other churches. A comparison of mean incomes as well as mean religiosity indicators yields substantial differences between religious groups. Household income of Mainline and PCCs as well as of those who practice traditional religion is higher, while it is lower for Apostolics and members of the St. Engenas ZCC. Indicators of religiosity in all Pentecostal Churches are higher than in Mainline Churches and highest in Zionist Churches. These statistical results from the survey will be re-examined in the following chapters using econometric techniques. The question of interest is, whether differences in household income across churches can be attributed to church membership or are due to other factors.

5 Model and Results

5.1 Empirical Model Specification

Following from the theoretical framework outlined in chapter 3, household income can be expressed as a function of household properties. This function is expressed by

$$I_i = F(a_{1i}, \ldots, a_{Ai}; g_{1i}, \ldots, g_{Gi}; hc_{1i}, \ldots, hc_{Ci}; sc_{1i}, \ldots, sc_{Si}; r_{1i}, \ldots, r_{Ri}; e_i), \quad (22)$$

where $i = 1, \ldots, N$ indexes the household. The income of household i, I_i, is determined by household characteristics $a_{1i}, \ldots, a_{Ai}$, geographical variables $g_{1i}, \ldots, g_{Gi}$, human capital variables (education and health) $hc_{1i}, \ldots, hc_{Ci}$, social capital variables $sc_{1i}, \ldots, sc_{Si}$, and variables measuring religiosity $r_{1i}, \ldots, r_{Ri}$. A, G, C, S, and R index the number of variables in the respective category. Furthermore, an error term e_i is included. In particular, the explanatory variables displayed in table 11 are included in the analysis. Variables related to household characteristics are the gender of the household head, his or her age,[16] and the size of the household. The age structure of the household is included as the shares of household members at or below school-going age and the share above retirement age. Geography is accounted for by the distance to the nearest tar road and distance to the central place for the respective area (the existence of large shops). Human capital variables are the school and tertiary education (learnerships and completed college/university degrees or diplomas) of the household head and the of all other household members out of school. For cases in which there are no other household members above school-going age, the mean value of school years completed across all other observations was used. A dummy variable for the existence of a clinic in the village was included as a proxy for health. Social capital is measured by the number of groups the household head is a member of, such as school committees, garden projects, and burial societies, the relation to the village chief and political party affiliation. Religiosity is measured by dummy variables for the respective religious groups and the practice of traditional religion. The underlying assumption is that different religious groups foster religiosity in different ways and different intensities.

[16] In regressions on household income, it is common to include the value of the age squared in order to limit the effect of increasing age. When including it in the estimated equations here, however, the coefficient of age squared is not significant. Moreover, the inclusion of age squared results in a steep increase of multicollinearity, with Variance Inflation Factors (VIF) of age and age squared of 52.2 and 50.5, respectively. Hence, in the interest of the simplicity of the model, age squared is not included.

Variable	Description	Category	Min.	Max.	Mean	Std. Dev.	Number	Percentage
inc	total household income (I^H) in R per month	dependent variable	305	32,735	4,356	4,933		
gender	dummy variable: female household head	household characteristics					116	64.4%
age	household head: age		21	101	54.67	14.97		
school	household head: highest school grade passed	human capital: education	0	12	5.76	4.84		
tertiary	household head: tertiary education (1=learnership, 2=college/university)		0	2	0.19	0.53		
mem_groups	household head: number of groups head is a member of	social capital	0	4	1.40	0.74		
rel_chief	household head: relation to the chief		0	3	0.56	0.81		
hmems	total number of household members	household characteristics	1	15	4.80	2.44		
s_hmems_young	share of household members at or below school-going age		0	1	0.45	0.28		
s_hmems_y51	share of household members born before 1951		0	1	0.14	0.21		
hmems_school_ms	other household members: average schooling of household members out of school (except household head)	human capital: education	0	12	8.28	2.89		
hmems_learn	other household members: Number completed learnership		0	2	0.12	0.34		
hmems_acad	other household members: Number completed college/university		0	2	0.09	0.30		
dist_road	distance to the nearest tar road in km	geography	0	18	3.58	3.95		
dist_shop	distance to the nearest central place		0	75	18.53	18.13		
clinic	dummy variable: clinic in the village	human capital: health					124	68.9%
church	dummy variable: household head member of church	religiosity					111	61.7%
church_m	dummy variable: household head member of Mainline Church						9	5.0%
church_zn	dummy variable: household head member of ZCC						36	20.0%
church_zl	dummy variable: household head member of St. Engenas ZCC						23	12.8%
church_a	dummy variable: household head member of Apostolic Church						23	12.8%
church_b	dummy variable: household head member of PCC (Bazalwane)						15	8.3%
church_o	dummy variable: household head member of other church						5	2.8%
trad_rel	dummy variable: household head practice of traditional religion						79	43.9%

Table 11: Descriptive Statistics of the Variables used in the Econometric Analysis (N=180)

Three different types of regression models were estimated. The first one is a regular log-linear model that assumed an additive relationship of the dependent and independent variable. The second model extend the first one by the inclusion of a HECKMAN (1978; 1979) control function estimator in order to test and control for selection bias. The third model type estimated is a multiplicative dummy model. In contrast to the other two models, this model is intrinsically nonlinear. All estimations were done with the software package SPSS Statistics, version 20.

5.2 Log-linear Model

An additive relationship of independent and dependent variables is assumed. A look at the income distribution graph (figure 13) suggests that the dependent variable, inc, is not normally distributed. In order to improve the distribution of the data, a BOX-COX (1964) test is conducted on inc. This test runs a series of power transformations on the data in order to determine what transformation would best change the distribution of the data to normal (OSBORNE 2010). Since SPSS itself does not contain a module for the BOX-COX test, it was done using the BOX-COX transformations dialog provided by GRÜNER (2012). The test yields value of $\lambda = 0$ at the lowest absolute Log-Likelihood value of -1810.208 (cf. the SPSS output in appendix 7). This means that a natural logarithmic transformation is appropriate. Hence, inc it is transformed to the variable $ln\_inc = \ln(inc)$, which is used in all estimations.

First, the log-linear income equation (23), which includes dummy variables for church membership and traditional religious practice, is estimated using ordinary least squares (OLS) estimation.

$$\begin{aligned} ln\_inc_i = {} & \beta_0 + \beta_1 \cdot gender_i + \beta_2 \cdot age_i + \beta_3 \cdot school_i + \beta_4 \cdot tertiary_i \\ & + \beta_5 \cdot mem\_groups_i + \beta_6 \cdot rel\_chief_i + \beta_7 \cdot hmems_i \\ & + \beta_8 \cdot s\_hmems\_young_i + \beta_9 \cdot s\_hmems\_y51_i + \beta_{10} \cdot hmems\_school\_ms_i \\ & + \beta_{11} \cdot hmems\_learn_i + \beta_{12} \cdot hmems\_acad_i + \beta_{13} \cdot dist\_road_i \\ & + \beta_{14} \cdot dist\_shop_i + \beta_{15} \cdot clinic_i + \beta_{16} \cdot church_i + \beta_{17} \cdot trad\_rel_i + e_i \end{aligned} \tag{23}$$

It is assumed that all Gauß-Markov conditions for OLS estimation are fulfilled.[17] In particular, these assumptions are that the residuals in the error term e_i have an expected value of 0 as well as constant variance (homoscedasticity) and are neither autocorrelated nor correlated with the explanatory variables. The estimation results are displayed in table 12, column A.

[17] The Gauß-Markov theorem contains four conditions under which OLS yields unbiased results (see VERBEEK 2012, 15–20)

The adjusted coefficient of determination (adjusted R^2) of the estimation is $adj.R^2 = 0.45$. The F-statistic of $F = 9.63$ shows that the model has significant explanatory value.[18] Since the p-value of the Kolmogorov-Smirnov test (KS-test) on normal distribution of the residuals is $p_{KS} = 0.65$, the null hypothesis that the residuals are normally distributed cannot be rejected.[19] Both, the F-test and the KS test yield equivalent results in all subsequent estimations presented; their results are not elaborated on in the subsequent paragraphs.

Furthermore, values for the Akaike Information Criterion (AkIC) and the Bayesian Information Criterion (BIC) are computed (cf. VERBEEK 2012, 66). These criteria are based on Bayesian statistics and allow comparison of different, non-nested models. They are calculated as

$$AkIC = \log\frac{1}{N}\sum_{i=1}^{N} e_i^2 + 2\frac{K}{N} \quad \text{and} \quad BIC = \log\frac{1}{N}\sum_{i=1}^{N} e_i^2 + \frac{K}{N}\cdot\log N\,, \tag{24}$$

where N is the number of observations, K the number of regressors, and i indexes the observations (households). In both criteria, a lower value indicates a better model, and in both cases the value increases with an increasing number of regressors. This increase is larger in the BIC, which thus tends to guide to simpler models. The AkIC provides better results in small samples. Values of both criteria are calculated and used in the model comparison.

[18] The F-test tests the hypothesis that all coefficients except for the intercept are equal to zero. The empirical F-value $F_{emp} = \frac{R^2/(K-1)}{(1-R^2)/(N-K)}$ (where K is the number of regressors and N the number of observations) is compared to the critical value of the F-distribution. For a detailed description see VERBEEK 2012, 26–28).

[19] On the KS-test See MASSEY 1951.

	A	B	D	E	G	H
constant	6.460*** (0.432)	6.184*** (0.440)	6.360*** (0.412)	6.505*** (0.465)	6.483*** (0.431)	6.627*** (0.478)
gender	-0.286*** (0.107)	-0.344*** (0.106)	-0.304*** (0.106)	-0.281** (0.112)	-0.312*** (0.103)	-0.318*** (0.103)
age	0.012** (0.006)	0.016*** (0.006)	0.014** (0.006)	0.012* (0.007)	0.012** (0.006)	0.012** (0.006)
school	0.029** (0.015)	0.034** (0.015)	0.033** (0.015)	0.031** (0.016)	0.030** (0.015)	0.029* (0.015)
tertiary	0.683*** (0.101)	0.648*** (0.103)	0.671*** (0.099)	0.671*** (0.100)	0.691*** (0.100)	0.698*** (0.103)
mem_groups	0.034 (0.069)	0.064 (0.069)	0.060 (0.068)	0.056 (0.069)		
rel_chief	-0.088 (0.061)	-0.086 (0.061)			-0.081 (0.060)	-0.079 (0.059)
hmems	0.101*** (0.026)	0.096*** (0.026)	0.092*** (0.025)	0.092*** (0.026)	0.089*** (0.022)	0.092*** (0.022)
s_hmems_young	-0.185 (0.239)	-0.179 (0.236)	-0.130 (0.231)	-0.084 (0.244)		
s_hmems_y51	0.260 (0.332)	0.166 (0.327)	0.142 (0.323)	0.216 (0.347)	0.278 (0.333)	0.281 (0.322)
hmems_school_ms	0.003 (0.018)	0.008 (0.018)			0.005 (0.018)	0.004 (0.018)
hmems_learn	0.213 (0.158)	0.231 (0.155)	0.206 (0.153)	0.218 (0.153)	0.242 (0.152)	0.226 (0.155)
hmems_acad	0.385** (0.171)	0.363** (0.169)	0.377** (0.167)	0.391** (0.167)	0.409** (0.168)	0.414** (0.171)
dist_road	-0.023 (0.014)	-0.024* (0.014)	-0.030** (0.014)	-0.027* (0.015)	-0.026* (0.014)	-0.025* (0.014)
dist_shop	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)
clinic	0.061 (0.107)	0.028 (0.105)	0.060 (0.106)	0.054 (0.107)		
church	0.181 (0.129)				0.202 (0.198)	0.058 (0.286)
church_m		0.286 (0.241)				
church_zn		0.469*** (0.160)	0.604 (0.526)	0.481 (0.501)		
church_zl		0.166 (0.173)				
church_a		-0.156 (0.166)				
church_b		0.268 (0.204)				
church_o		0.372 (0.313)				
trad_rel	0.258** (0.125)	0.314** (0.124)	0.235** (0.104)	0.185 (0.123)	0.317 (0.409)	0.056 (0.550)
λ			-0.111 (0.204)		-0.027 (0.143)	
λ_1				-0.092 (0.185)		0.045 (0.172)
λ_2				1.531 (1.957)		0.939 (1.379)
N, K	180, 18	180, 23	180, 17	180, 18	180, 16	180, 17
Adj. R^2	0.45	0.48	0.46	0.46	0.45	0.45
F-statistic	9.63	8.50	10.71	10.12	10.89	10.20
AkIC, BIC	-0.88, -0.56	-0.91, -0.51	-0.93, -0.64	-0.91, -0.59	-0.90, -0.61	-0.89,-0.59
KS-Test (p-value)	0.65	0.87	0.70	0.82	0.69	0.68

Dependent variable: *ln_inc*.
Columns A, B: standard errors in parentheses; Columns D, E, G, H: corrected standard errors in parentheses
*, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively

Table 12: Estimation Results Log-linear Model

Eight of the coefficients are significant at least at the 5 percent level.[20] All of the significant coefficients have the expected sign. The coefficient of *gender* is negative; if the household head is a woman, household income is lower. The variable *age* has a positive coefficient. The older the household head, the higher is household income. Higher education leads to higher income as well. This is expressed in the positive the coefficients of *school*, *tertiary*, and *hmems_acad*. Furthermore, the number of household members (*hmems*) has a positive coefficient as well. Larger households have higher incomes. Looking at the religiosity variables, the coefficient of church membership is positive, but it is not significant. The coefficient on traditional religion, however, is positive and significant. Church membership in general does not seem to impact on household income.

Due to the natural logarithmic transformation of the dependent variable, the interpretation of the coefficients is not as straightforward as without such transformation. In order to calculate the effect a variable has on household income, one needs to reverse the transformation by taking the exponential function of the natural logarithm of income: $inc_i = e^{ln\_inc_i}$. Since ln_inc is composed additively of the variables multiplied by their respective coefficients, income of household i can be written as

$$inc_i = e^{\beta_0 + \beta_1 \cdot x_{1i} + \ldots + \beta_K \cdot x_{Ki}} = e^{\beta_0} \cdot e^{\beta_1 \cdot x_{1i}} \cdot \ldots \cdot e^{\beta_K \cdot x_{Ki}}, \quad (25)$$

where $\beta_1, \ldots, \beta_K$ are the coefficients from equation (24) and $x_{1i}, \ldots, x_{Ki}$ the values of the variables for household i. K is the number of explanatory variables including the constant. The effect of a specific variable can be calculated as $e^{\beta_j \cdot x_{ji}}$. Correspondingly, the effect of traditional religion is $e^{0.258 \cdot 1} = 1.294$. That is, where the household head practices traditional religion, predicted household income is 29.4 percent higher than in a household with otherwise equal characteristics whose head does not practice traditional religion.

Second, the same estimation is done including dummy variables for the different church categories:

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[20] The significance of the variables is calculated with a two-sided t-test, which tests the hypothesis that the coefficient is equal to zero by comparing the empirical t-value $t_{emp} = \frac{\beta_j}{s_j}$ (where s_j is the standard error of coefficient β_j) to the critical value of the t-distribution. See VERBEEK (2012, 23–25).

$$ln\_inc_i = \mathbf{x}_i\boldsymbol{\beta} + \beta_{16}\cdot church\_m_i + \beta_{17}\cdot church\_zn_i + \beta_{18}\cdot church\_zl_i + \beta_{19}\cdot church\_a_i + \beta_{20}\cdot church\_b_i + \beta_{21}\cdot church\_o_i + \beta_{22}\cdot trad\_rel_i + e_i, \quad (26)$$

where $\boldsymbol{x_i}$ is a 1×16 vector composed of all regressors except for the religiosity variables and $\boldsymbol{\beta}$ a 16×1 vector of the respective coefficients. The results are displayed in table 12, column B. Although the number regressors has increased to $K = 23$, the model seems to have better explanatory power. The adjusted R^2 has gone up to $adj.R^2 = 0.48$ and the AkIC down to $AkIC = -0.91$, indicating a better model. This result, however, is not unequivocal, since the BIC, which imposes a harsher penalty for a higher number of regressors has increased to $BIC = -0.51$. With one exception, the same coefficients as before are significant. The variable *dist_road* is now significant at the 10 percent level. When taking a closer look, however, the change to the previous model is marginal. The coefficient changed by 0.01, causing the it to slide just below the 10 percent error margin. Only one coefficient of a church variable is significant, the coefficient of *church_zn*, the dummy variable for membership in the ZCC. In terms of magnitude, the coefficient is only excelled by the coefficient of tertiary education. Traditional religion is still significant, with a slightly larger coefficient than before. Four of the other religiosity dummies have positive coefficients and the coefficient of the dummy for membership in Apostolic Churches is negative (but not significantly so).

5.3 Correction for Selection Bias

Departing from the results of section (5.2), the question arises whether the effect of *church_zn* and *trad_rel* on household income are really due to these variables. As IANNACCONE (1998, 475) phrases this objection (though with reference to the social effects of religion among youth in the United States): “Good kids may avoid drugs, stay in school, *and* go to church” (emphasis original). Applied to the context under consideration here, this implies that there could be an unobserved variable that influences both household income and the decision to practice a certain religion. Perhaps only those who already have a higher work ethic choose to practice religion. Another issue is reverse causation. Perhaps those who already have a higher income choose to become members of the ZCC. These are issues of selection bias. Religiosity is not – as assumed – an exogenous variable, but actually endogenous. This biases the results. In general terms, selection bias arises when the probability of an observation in

the sample to be in a certain category depends on the explained variable (VERBEEK 2012, 257). On a more technical note, this implies that the variable whose effect is to be measured is correlated with the error term of the estimated equation (CAMERON and TRIVEDI 2005, 868). Since assignment of households to religious categories is not random but by the choice of the household head, there might be an unobserved selection effect.

In order to test if there is selection bias and to correct it the HECKMAN (1978, 1979) two-step procedure is employed. In particular, a dummy variable model with endogenous switching is used. This approach is, for example, applied in BLUNDELL and COSTA DIAS (2000), SHAVER (1998), TUCKER (2007), TUCKER (2010), and VELLA and VERBEEK (1999). The following outline is based on VERBEEK (2012, Ch. 7), CAMERON and TRIVEDI (2005, Ch. 25), and TUCKER (2010). Specific references to these authors and references to other authors are indicated. In this method, a control function estimator, commonly called HECKMAN's λ, is included in the estimation equation. The values of HECKMAN's λ can be computed from the generalized residual of a probit estimate of the probability that a household is in a certain religion category r (in the present case *church_zn* or *trad_rel*):

$$r_i^* = \boldsymbol{z_i}\boldsymbol{\gamma} + u_i, \tag{27}$$

where $\boldsymbol{z_i}$ is a $1 \times K$ vector of the K explanatory variables and $\boldsymbol{\gamma}$ a $K \times 1$ vector of the respective coefficients in the probit model. u_i is the error term, which is assumed to be normally distributed. The household's category is $r_i = 1$ if $r_i^* > 0$ and $r_i = 0$ otherwise. This probit model can contain the same variables as the income equation, but needs to contain "at least one nontrivial determinant" of r_i, denoted z_1, which can be seen as an instrumental variable that is uncorrelated with household income except through its correlation with r_i (CAMERON and TRIVEDI 2005, 870). HECKMAN's λ is the inverse Mill's ratio, which is given by

$$\lambda_1 = \frac{\varphi(\boldsymbol{z_i}\boldsymbol{\gamma})}{\Phi(\boldsymbol{z_i}\boldsymbol{\gamma})} \tag{28}$$

for the $r_i = 1$ cases and

$$\lambda_0 = -\frac{\varphi(\boldsymbol{z_i}\boldsymbol{\gamma})}{1 - \Phi(\boldsymbol{z_i}\boldsymbol{\gamma})} \tag{29}$$

for the $r_i = 0$ cases. $\varphi(\boldsymbol{z_i}\boldsymbol{\gamma})$ is the probability density function of the standard normal

distribution and $\Phi(z_i\boldsymbol{\gamma})$ the cumulative density function. HECKMAN's λ is interacted with the dummy of the religion category r.

$$ln\_inc_i = \mathbf{x}_i\beta + \beta_r r_i + \beta_{\lambda_1}\lambda_{1i} r_i + \beta_{\lambda_0}\lambda_{0i}(1-r_i). \quad (30)$$

The latter terms "switch" on and off depending on whether a household is in the $r_i=1$ category or not (cf. ibid., 868). The coefficient on r, β_r, is the true effect of the dummy variable. The coefficients of HECKMAN's λ, β_{λ_1} and β_{λ_0} are the estimated covariances between the unobserved variables in the error term of the selection equation (27), u_i, and the unobserved variables in the error term of the income equation equation, e_i. When there is no correlation between the error terms, there is no selection bias from unobserved variables (TUCKER 2010, 43). A test on selection bias, therefore, is a t-test on the coefficients of λ_1 and λ_0 (VELLA and VERBEEK 1999, 476). If these coefficients are not significant in the regression equation, there is no selection bias due to unobserved variables. As pointed out by HECKMAN (1979; cf. VERBEEK 2012, 252), the standard errors reported in the regression are inappropriate and have to be corrected. This is done according to the procedure outlined ibidem.

Alternatively to the model outlined, the coefficients of λ can be constrained to be the same (i.e., $\beta_{\lambda_1} = \beta_{\lambda_0} = \beta_\lambda$). This is done in the standard treatment effects model outlined by GREENE (2003, 788; cf. VELLA and VERBEEK 1999, who refer to this as the "restricted control function estimator"). The ATE can as well be estimated in this framework, but the above outlined model is less restrictive and allows for additional interpretations of the coefficients, such as the calculation of the average treatment effect on the treated (ATET, sometimes denoted ATT). The results of both models are presented below; the SPSS Syntax used for all computations can be found in appendix 8. A more sophisticated model that allows for selection on observables and on unobservables simultaneously is outlined, for example, by CAMERON and TRIVEDI (2005, 870). They allow the coefficients of the observed variables to differ. Such model is, however, not feasible in the context of this study because the number of observations for some of the variables is so low that the error due to nonrandom distribution would distort the results. Following the procedure outlined, first a probit model with *church_zn* as the dependent variable is estimated:

$$\begin{aligned} prob\left(r_i^{church\_zn}=1\right) = {} & \gamma_0 + \gamma_1 \cdot gender_i + \gamma_2 \cdot age_i + \gamma_3 \cdot school_i + \gamma_4 \cdot tertiary_i \\ & + \gamma_5 \cdot mem\_groups_i + \gamma_6 \cdot rel\_chief_i + \gamma_7 \cdot hmems_i \\ & + \gamma_8 \cdot s\_hmems\_young_i + \gamma_9 \cdot s\_hmems\_y51_i \\ & + \gamma_{10} \cdot hmems\_school\_ms_i + \gamma_{11} \cdot hmems\_learn_i \\ & + \gamma_{12} \cdot hmems\_acad_i + \gamma_{13} \cdot dist\_road_i + \gamma_{14} \cdot dist\_shop_i \\ & + \gamma_{15} \cdot clinic_i + \gamma_{16} \cdot trad\_rel_i + u_i \end{aligned} \quad . \qquad (31)$$

The results of the estimation are displayed in table 13, column C. The model has significant explanatory power, which follows from the likelihood-ratio test statistic of $LR = 43.8$.[21] The Cox and Snell, Nagelkerke, and McFadden Pseudo-R^2 statistics of 0.216, 0.342, and 0.243, respectively, show that the explanatory power of the model is at least "acceptable" according to BACKHAUS et al. (2012, 276). The significance of the coefficients is tested with the Wald test, which compares the Wald statistic

$$w_j = \left(\frac{\gamma_j}{s_j}\right)^2 \qquad (32)$$

(where γ_j is the estimated parameter and s_j its standard error) to the theoretic χ^2 distribution with 1 degree of freedom.[22] Values of w_j higher than 3.84 and 6.63 allow us to reject the null hypothesis that the parameter is not significant with 5 and 1 percent error probability, respectively. The probability of being a member of the ZCC is higher for women and when the relationship with the chief is closer; the variable *gender* is significant at the 1 percent level and *rel_chief* is significant at the 5 percent level. On the other hand, a higher educational level of the other household members and traditional religion decrease the probability.

Since the probit regression needs to contain at least one nontrivial explanatory variable that is not included in the income regression, the two variables *hmems_school_ms* and *rel_chief* are excluded from the income regression for the purposes of this procedure. Their coefficients are not significant in the income regression (table 12, column B) but are significant in the probit analysis (table 13, column C). Thus, they are the instruments used to predict membership in the ZCC. To ensure that the exclusion of these variables does not already change the results, the income equation is estimated without them. This yields essentially the same results, with the difference that *dist_road* is now significant at the 5 percent level (see appendix 9, model J for the details).

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[21] The LR value is compared to the value of the critical value of the χ^2 distribution with 16 degrees of freedom. Since $LR = 43.8 > \chi^2_{16,0.01} = 32.00$. See BACKHAUS et al. 2011, 268–269.

[22] See BACKHAUS et al. 2011, 280.

		C		F	
dependent variable		church_zn		trad_rel	
		Estimate	Wald	Estimate	Wald
constant		-0.828 (1.154)	0.515	-1.079 (1.081)	0.996
gender		0.832*** (0.350)	5.658	-0.404 (0.265)	2.323
age		-0.027 (0.017)	2.595	0.000 (0.015)	0.000
school		-0.069 (0.044)	2.406	-0.037 (0.040)	0.871
tertiary		0.034 (0.272)	0.015	0.125 (0.256)	0.239
mem_groups		0.003 (0.186)	0.000	0.198 (0.172)	1.320
rel_chief		0.334** (0.163)	4.181	0.087 (0.149)	0.344
hmems		-0.007 (0.068)	0.011	-0.007 (0.065)	0.012
s_hmems_young		0.770 (0.654)	1.387	0.904 (0.623)	2.105
s_hmems_y51		-0.148 (1.105)	0.018	0.446 (0.828)	0.290
hmems_school_ms		-0.110** (0.050)	4.910	-0.010 (0.046)	0.051
hmems_learn		0.116 (0.409)	0.081	0.033 (0.389)	0.007
hmems_acad		0.345 (0.453)	0.581	0.350 (0.429)	0.667
dist_road		0.005 (0.037)	0.020	0.001 (0.036)	0.000
dist_shop		0.004 (0.008)	0.200	0.006 (0.008)	0.536
clinic		0.180 (0.298)	0.367	-0.516* (0.265)	3.806
church				-2.027*** (0.269)	56.990
trad_rel		-1.120*** (0.307)	13.310		
N, K		180,17		180,17	
Distribution	0	144 (80.0%)		101 (56.1%)	
	1	36 (20.0%)		79 (43.9%)	
LR		43.829		93.166	
Cox and Snell Pseudo R^2		0.216		0.404	
Nagelkerke Pseudo R^2		0.342		0.541	
McFadden Pseudo R^2		0.243		0.377	

Standard errors in parentheses
*, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively

Table 13: Probit Estimates of ZCC membership and African Traditional Religion

The estimation results of the income equation under the inclusion of HECKMAN's λ calculated from the probit estimates are given in table 12, columns D and E. Column D gives the results for the more restrictive model that imposes the constraint $\beta_{\lambda} = \beta_{\lambda_1} = \beta_{\lambda_0}$; the results for the model that allows the λ s to differ is given in column E. The F-value confirm the models' significance. The adjusted R^2 as well as AkIC and BIC have not changed much in either of the two models. In the restricted model, the

coefficient of *church_zn* is not significant anymore, but neither is β_λ. This is an unusual result. One would expect either one of them or both to be significant – the effect measured in estimation B is either due to ZCC membership or due to selection bias or both. But here the effect disappears altogether. The results are similar when allowing the coefficients of λ to differ. There is, however, one difference. In model E, the coefficient of *trad_rel* is not significant, either. A possible explanation for these results is that the instruments used in the probit estimation, *rel_chief* and *hmems_school_ms*, are too weak (cf. CAMERON and TRIVEDI 2005, 871). This would mean that, although their coefficients are significant in the probit regression, they do not suffice as "nontrivial components" of z_i. Furthermore, it is possible that the number of observations in general and particularly in the category *church_zn* in particular is too low, especially when allowing β_{λ_1} to differ from β_{λ_0}. Nevertheless, since the coefficients of λ are not significant, one cannot the hypothesis that there is no selection bias of membership in the ZCC.

With respect to traditional religious practice, the problem of weak instruments is more severe. The specification of the probit model is analogous to equation (31), with *trad_rel* as the dependent and the inclusion of *church* on the right hand side. Table 13, column F gives the results of the probit estimate. The model is significant ($LR = 93.16$) and has good pseudo R^2 values. The only highly significant coefficient of the coefficient of *church*, but it is also highly correlated with *trad_rel* (correlation coefficient of -0.66). Therefore it cannot be the instrument. There are hardly any good instruments to predict *trad_rel*. Apart from the coefficient of *church*, the only one that is significant (although with 10 percent error probability) is the coefficient of *clinic*. This variable, along with two other ones that have a comparatively high Wald statistic, *mem_groups* ($w_j = 1.32$) and *s_hmems_young* ($w_j = 2.11$), is used. It is excluded from the income equation, which does not change the results much (see appendix 9, model K). The results of the income equation under the inclusion of HECKMAN's λ are displayed in table 12 columns G and H. The coefficients of the λs are not significant; neither is the coefficient of traditional religion. This is no surprise considering the weakness of the instruments. Although the hypothesis that there is no selection bias cannot be rejected, this result is most likely due to the lack of appropriate instruments.

5.4 Multiplicative Dummy Model

In addition to the log-linear models described above, a nonlinear model was estimated. Consistent with the theoretical framework of chapter 3, it is assumed that religiosity is not merely an asset that enters the income equation additively. As religiosity changes the household's utility function there are interaction effects with other variables. To account for such interaction, the subsequent equation (33) was estimated, in which the multiplicative coefficients have a value of $\alpha_j = 1$ if the respective religion dummy variable has a value of $r_j = 0$, since $\alpha_j^0 = 1$ for all values of α_j.

$$\begin{aligned} ln\_inc_i \;=\; & \alpha_1^{church\_m_i} \cdot \alpha_2^{church\_zn_i} \cdot \alpha_3^{church\_zl_i} \cdot \alpha_4^{church\_a_i} \cdot \alpha_5^{church\_b_i} \cdot \alpha_6^{church\_o_i} \cdot \alpha_7^{trad\_rel_i} \cdot (\beta_0 \\ & + \beta_1 \cdot gender_i + \beta_2 \cdot age_i + \beta_3 \cdot school_i + \beta_4 \cdot tertiary_i + \beta_5 \cdot mem\_groups_i \\ & + \beta_6 \cdot rel\_chief_i + \beta_7 \cdot hmems_i + \beta_8 \cdot s\_hmems\_young_i \\ & + \beta_9 \cdot s\_hmems\_y51_i + \beta_{10} \cdot hmems\_school\_ms_i + \beta_{11} \cdot hmems\_learn_i \\ & + \beta_{12} \cdot hmems\_acad_i + \beta_{13} \cdot dist\_road_i + \beta_{14} \cdot dist\_shop_i + \beta_{15} \cdot clinic_i) \\ & + e_i \end{aligned} \tag{33}$$

The income equation is multiplied by the effect of the church and/or traditional religion dummy. The model is estimated by nonlinear least squares estimation. Hypothesis testing for this nonlinear model can be done in the same way as in the linear case, with the limitation that the results are valid only asymptotic (GREENE 2003, 172). There is one exception. In the case of the t-test on the coefficients of the multiplicative dummies, the t-ratio is not calculated as

$$t_j = \frac{\alpha_j}{s_j} \text{ but as } t_j = \frac{\alpha_j - 1}{s_j}, \tag{34}$$

where s_j is the standard error of the coefficient α_j. This is due to the fact that the multiplicative coefficient is raised to the power of the religiosity dummy, that is to the power of 0 or 1. A coefficient of $\alpha_j = 1$ implies that there is no effect, equivalent to the linear case where a coefficient of $\beta_j = 0$ implies no effect. In this multiplicative model, one needs to test whether the coefficient is different from 1 and not if it is different from 0 (cf. the comparable case in GREENE, ibid.). Table Fehler: Referenz nicht gefunden, column I displays the results. The adjusted R^2 as well as the AkIC and BIC values are almost the same as in the log-linear model with multiple church category dummies (table 12, column B). Also the same coefficients are significant, the coefficients of the constant, *gender*, *age*, *school*, *tertiary*, *hmems*, *hmems_acad*, *dist_road*, church_zn, and of *trad_rel*. The coefficients of other church dummies are not significant, but it is noteworthy that also in this regression the sign of the

	I
constant	6.225 ***
	(0.420)
church_m	1.034
	(0.029)
church_zn	1.059 ***
	(0.021)
church_zl	1.019
	(0.022)
church_a	0.979
	(0.021)
church_b	1.034
	(0.027)
church_o	1.042
	(0.040)
trad_rel	1.039 **
	(0.016)
gender	-0.332 ***
	(0.103)
age	0.015 ***
	(0.006)
school	0.033 **
	(0.015)
tertiary	0.622 ***
	(0.102)
mem_groups	0.062
	(0.067)
rel_chief	-0.085
	(0.058)
hmems	0.094 ***
	(0.025)
s_hmems_young	-0.182
	(0.227)
s_hmems_y51	0.151
	(0.316)
hmems_school_ms	0.008
	(0.017)
hmems_learn	0.216
	(0.150)
hmems_acad	0.348 **
	(0.163)
dist_road	-0.023 *
	(0.013)
dist_shop	0.004
	(0.003)
clinic	0.032
	(0.101)
N, K	180,23
Adjusted R^2	0.48
AkIC, BIC	-0.91, -0.50
KS-test (p-value)	0.88

Dependent variable: *ln_inc*
Asymptotic standard errors in parentheses
*, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively

Table 14: Results Multiplicative Dummy Model

coefficient of membership in Apostolic Churches (*church_a*) is negative.

The effect of one of the dummies on household income, for example *church_zn* , can be calculated by

$$\begin{aligned} inc_i &= e^{\alpha_2^1 \cdot (\beta_0 + \beta_1 \cdot x_{1i} + \ldots + \beta_v \cdot x_{vi})} \\ &= \left(e^{(\beta_0 + \beta_1 \cdot x_{1i} + \ldots + \beta_v \cdot x_{vi})}\right)^{\alpha_2^1}, \end{aligned} \tag{35}$$

where the notation is the same as in (27). That is, membership in the ZCC causes income to be raised to the power of $\alpha_2^1 = 1.059$ and traditional religious causes income to be raised to the power of $\alpha_7^1 = 1.039$. Assuming a male household head (neither church member nor practicing traditional religion) at the age of 55 with 12 years of school education living in a household of 5 people, the predicted income is calculated as

$$\begin{aligned} inc_i &= \left(e^{(6.225+0.015 \cdot 55+0.033 \cdot 12+0.094 \cdot 5)}\right) \\ &= 2740.79 \end{aligned} . \tag{36}$$

If the man practices traditional religion, the predicted income is raised to the power of $\alpha_7^1 = 1.039$, that is $2740.79^{1.039} = 3732.10$.

6 Discussion

Religiosity is the degree to which religion is relevant in and influences a person's life. It can affect economic success at the microeconomic level in two ways. Through its intrinsic dimension – belief, spirituality, values – it changes people's attitudes. The theoretical predications from social sciences and theological literature are that religiosity fosters work ethic and thrift. Expressed in the economic terms of a utility-maximizing household this means, that religiosity changes the household's preferences. The social dimension of religiosity – joint worship and other religious activities – constitutes a social-capital type resource. It thus enhances opportunities of economic success.[23] It is assumed that the higher a person's religiosity, the larger are its economic impact.

Pentecostal Churches, which emphasize the holy spirit as a driving force in believers' every day lives, foster an intensive religiosity. While the social sciences and theological research argues that Pentecostal Churches in South Africa have a positive effect on the economic success of their members, this has not been directly investigated with econometric methodologies. Quantitative economic research on religion and economic focuses mainly on country comparisons. The results thereof are ambiguous – at the same time supporting and refuting the theoretical predications. Furthermore, methodological problems such as aggregation, data interpolation, the heterogeneity of religion, and latent variables are not yet resolved.

Following the recommendations in the literature, this study investigates the matter in an approach at the microeconomic (i.e., household) level, focusing on one municipality in the Limpopo Province of South Africa. By analyzing a limited geographic area the number of possible unobserved variables distorting the results is reduced. The approach is contextual in the sense that the locally relevant belief categories are used in order to ensure that the heterogeneity of religion across different contexts is accounted for. Moreover, the locally relevant sources of household income (the indicator of economic success) are used. This includes implicit income from subsistence farming calculated using the area under cultivation and the retail prices households buy food at. In a field study, data was collected by means of a household survey. This data is analyzed using

[23] The term *economic success* used in the context of this study is not to imply exuberant wealth but simply doing well in comparison with others in the same economic environment; cf. section 3.3.

econometric methodologies. Different econometric models are employed and the results are robust across the different model specifications. Subsequently, five main results are discussed.

First, Pentecostal Churches – including both African Independent Churches and Pentecostal-Charismatic Churches – seem to foster a higher degree of religiosity. Average prayer frequency as well as the average weekly service attendance and other congregational activity attendance in Pentecostal Churches is higher than in Mainline Churches. This finding is in accordance with the literature on the Pentecostal movement. The religiosity measured is highest in the two Zionist Churches, Zion Christian Church and St. Engenas Zion Christian Church. On average, ZCC members pray more often and attend more congregational activities than members of all other churches. In terms of service attendance, they are second only to the members of St. Engenas ZCC, who have the highest average weekly church attendance.

Second, church membership in general does not impact on household income. The effect rather varies according to the different church categories. PCCs, Mainline Churches, ZCC, St. Engenas ZCC, and other churches have a positive coefficient, whereas the coefficient of Apostolic Churches is negative. However, the effect is only significant in the case of the ZCC. The comparison of the mean household income of church members yields that members of Mainline Churches have by far the highest income and also that the income of PCC members is higher than the average income in the survey population. In the econometric analysis, however, membership in these churches does not have a significant positive effect. This is due to the fact that the econometric analysis corrects for other characteristics of the households such as household size and education. When accounting for these factors, Mainline and PCC members' income is not significantly higher. The higher income in these churches might be due to a higher education of their members.[24] Particularly the result for PCCs is at odds with the social sciences and theological literature that argues that PCCs do impact on economic success. With respect to the negative effect of the Apostolic Churches (though not significant) it is interesting that this category is made up of a relatively large number of churches. Apparently the religious network the church members can dispose of is much smaller compared to other churches. Furthermore, members of these churches seem to be less involved in other activities. A negative effect, hence, could be

[24] Of course, it is conceivable that religiosity is causative of education. Such an effect is not picked up by the econometric model specifications employed here.

due to lower social capital. The results for all churches other than the ZCC must be interpreted with one reservation: The number of observations in these categories is at least 36 percent lower than the number of observations in the ZCC. Hence, the fact that there are no significant effects for these churches could partly be due to the low number of observations that results in large standard errors. An investigation based on a larger data set is be necessary to exclude such possibility.

Third, membership in the ZCC has a significant positive impact on household income. The results from the log-linear regression imply that household income is on average 47 percent higher where the household head is a member of the ZCC relative to households with otherwise equal characteristics where the household head is a member of another church or not member of any church. This is particularly striking in light of the fact that indicators of religiosity are highest in this church. The finding on the positive impact of ZCC supports the results of previous qualitative research, in particular MAFUTA (2010).

Fourth, the practice of African traditional religion has a significant positive impact as well, although the effect is not as large as the one of the ZCC. Household income is significantly higher (in the log-linear estimation by 29%) when the household head specified that he or she brought sacrifices to the ancestral spirits.

Fifth, there seems to be no bias due to latent variables or reverse causation. Using the HECKMAN (1978; 1979) two-step estimator to test and correct for selection bias, the hypotheses that there is no selection bias of ZCC membership and traditional religion cannot be rejected. These results stand on somewhat weak grounds due to data limitations. Particularly for traditional religion, the instruments predicting a person's decision to practice it are weak. Furthermore, the number of observations is relatively low. Therefore, the results could also imply that selection bias does influence the results but could not be identified. Here also, further research using larger data sets is required to verify the results. In particular, such data sets need to contain adequate instruments that predict church membership and traditional religion in order to be able to control for latent variables and reverse causality.

Therefore, it is concluded that religiosity does impact on economic success in the particular context under consideration. However, this is no general effect. In particular, the religiosity expressed in membership of the ZCC and in African traditional religion has a positive effect, whereas for all other churches no significant impact could be

identified. The ZCC has been documented in the literature as a church that fosters a high degree of both intrinsic and social religiosity, which is confirmed by the survey results of this study. Whether the impact of the ZCC is due to intrinsic religiosity or due to its social capital function cannot be discerned here. Possibly it is both, a well-led life, frugality and hard work on the one hand combined with a large and close network provided by the church on the other hand. The finding that traditional religious practice impacts on economic success has to my knowledge not been documented before. I am not aware of any theoretical arguments on how traditional religion would transmit to economic success. It is conceivable that a special relationship with the ancestors is a form of intrinsic religiosity. Believing that a deceased father, mother, or grandparents watch and influence one's daily life might well affect a person's behavior in a similar way as the religiosity of churches. Taking the results of this study as a starting point, it remains for future research to investigate how exactly religiosity transmits to economic success in the ZCC and African traditional religion.

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Appendices

Appendix 1: Questionnaire

Household Questionnaire — Philipp Öhlmann, Humboldt-Universität zu Berlin

Questionnaire Number		
Distance to tar road		[km]
Reliabilty / Remarks		

1. Socio-demographic Characteristics

1.a Mohlokomedi wa lapa / Motho yo a rwalago maikarabelo

Gender		❑ Monna	❑ Mosadi
Age	**Le belegwe neng?**		

School		❑ O sa se tsena
Le feditše sekolo ka mphato ofe?		
Tertiary Education		[Code 1-6]
Le ile la tsena college goba yunibesithi?		
Le na le tikrii ya college goba yunibesithi?		
Le ile la tsena sekolo sa mošomo?		

Tertiary education codes
1 = unfinished learnership
2 = learnership
3 = unfinished college
4 = college
5 = unfinished university
6 = university

Schooling codes
0 = No schooling
1 = G1/Sub A
2 = G2/Sub B
3 = G3/S1
4 = G4/S2
5 = G5/S3
6 = G6/S4
7 = G7/S5
8 = G8/S6/F1
9 = G9/S7/F2
10 = G10/S8/F3
11 = G11/S9/F4
12 = G12/S10/F5

1.b Members of the household

Mo lapeng le go dula batho ba bakae? (Batho ba ba robalago mo lapeng matšatši a a fihlago a mane mo bekeng)

	Motho wa mathomo ke lena. Motho wa bobedi, o...				
	O belegwe neng?	O feditše sekolo ka mphato ofe?		Tertiary Education	
2			❑ O sa se tsena		[Code 1-6]
3			❑ O sa se tsena		[Code 1-6]
4			❑ O sa se tsena		[Code 1-6]
5			❑ O sa se tsena		[Code 1-6]
6			❑ O sa se tsena		[Code 1-6]
7			❑ O sa se tsena		[Code 1-6]
8			❑ O sa se tsena		[Code 1-6]
9			❑ O sa se tsena		[Code 1-6]
10			❑ O sa se tsena		[Code 1-6]
11			❑ O sa se tsena		[Code 1-6]
12			❑ O sa se tsena		[Code 1-6]

1.c Social Status

Maemo a lapa le ke afe setšhabeng? / Mošomo wa lena setšhabeng ke eng?		
Tona		[0/1]
Moetapele wa koma		[0/1]
Le leloko sehlopa sa poloko?		[0/1]
Le leloko la serapa sa community garden project?		[0/1]
Le na le karata ya boleloko bja mokahlo wa dipolitiki?		[0/1]
Le moleloko wa dihlopa tše dingwe?		[0/1;efe]
Le tswalana bjang le ba mošate?		[Code 0-4]

Chief's family codes
0=no
1=distant familyor council member and no relation
2=2nd degree relation (e.g. cousin) or distant relation and council member
3=1st degree relation (e.g. brother) or relation and senior councillor
4=chief him/herself

2. Distances

2.a Central locations

Le ya kae go reka dijo (mabenkele a magolo)?			[km]
Go na le kliniki mo motseng?			[km]

3. Religion / Tumelo

Dipotšišo tše di lebane le mohlokomedi wa lapa le / Questions apply to household head

3.a Church attendance

Naa le tsena kereke efe?	Le thomile neng go tsena kereke ye?	Le tsenela ditirelo tše kae mo kerekeng?		Le tsenela mediro ye mengwe ya phutego gakae (go swana le khwaere goba mekgatlo ya banna goba ya basadi goba dihlopa tša baswa etc.)? / Le tšea karolo efe mo kerekeng?	
			❑b/❑k/❑ng		❑ beke / ❑ kgwedi / ❑ ngwaga
Le tsena kereke ye ngwe gape?			per year		times per year
			❑b/❑k/❑ng		❑ beke / ❑ kgwedi / ❑ ngwaga
			per year		times per year

3.b Traditional Religion

Le a phasa?		[0/1]

3.c Praying

Naa le rapela ka nnoši? Gakae?		ka beke

4. Agriculture / Temo

4.a Field crops

Le a lema mašemong naa?

Area

Le na le mašemo a makae?		❑ Morgen / ❑ ha

Water

Ka ntle ga pula, o na le meetse a go humanago go tšweletša temo ya gago pele?		[0/1]

Crops

Ke dibjalwa dife tšeo o di bjalago tšemong ya gago?		
Dibjalwa dife?	**Ka tlwaelo le buna … … (mafela a ma) kaakang ka ngwaga o tee?**	**Le rekiša … ka bokae?**
Mafela / Mahea		
Mabele		
Leotša / lebelebele		
Magapu		
Dinawa		
Dipongisi		
Marotse		
		Income from field crops

Le lema ka eng?	❑Tonki	❑Terekere		
Le ba lefa bokae / Terekere ke bokae?		Ka tšhelete		
Le tšhela manyoro?	[0/1]	[ke eng?]	Ke bokae?	
			Input costs – field crops	

4.b Vegetables (harvest year round)
Le bjala dibjalo ka tšhingwaneng / serapeng?

Area

Serapa ke se se kaakang?		m²

Vegetables

Le bjala dibjalo dife?			
Dibjalo	**Area (m²)**	**Ka tlwaelo le buna … kaakang ka beke?**	**Le rekiša … ? / Le rekiša … ka bokae? (refer to quantity given)**
Beetroot			
Carrot			
Dintso			
Ditamati			
Eie			
Khabetšhe			
Morogo			
Pepper			
Potato			
Spinatšhe			
			Income from gardening

Le tšhela manyoro?	[0/1]	[ke eng?]	Ke bokae?	
			Input costs – garden vegetables	

4.e Livestock and poultry
Naa le na le diruiwa?

Diruiwa	**Le na le … tše kae?**	**Ka tlwaelo le rekiša … tše kae ka kgwedi?**	**Ka tlwaelo le rekiša ka bokae … e tee?**	**Le hlaba … tše kae ka ngwaga?**
Dikgomo				
Dipudi				
Dinku				
Dikolobe				
Dikgogo				
Ditonki				
				Income from l+p

Livestock and poultry products

Le a gama? Le tlatša dibuckete tše kae ka letšatši? Buckete ke dilitere tše kae?	
Maswi a kgomo	litres
Maswi a pudi	litres
Maswi a nku	litres
Le humana mae a makae ka letšatši?	

Income from l+p products	

Naa le hira batho go hlokomela diruiwa tša gago?				
❑ Aowa	❑ Ee →	**Le ba le fa bokae?**		ka ❑ beke / ❑ kgwedi / ❑ ngwaga
				Labour costs l+p

4.f Fruits

Naa le na le mehlare ya dikenywa? E mekae?	

4.g Firewood

Le rwallela dikgong tša mollo? (for home use only)				
❑ Aowa	❑ Ee →	**Le rwallela gakae?**		ka beke

Total income from agriculture	

5. Household Income / Letseno

5.a Formal sector income

Le a šoma naa? Batho ba bangwe ba ba dulago mo lapeng ba a šoma? (formal employment)			**Batho ba ba dulago ka mo lapeng le ba humana letseno la digwebong tša bona na? (formal business)**		
	Le / o šomang?	Tefo ke bokae?		Kgwebo ya lena / gagwe ke eng?	Ka tlwaelo le / o dira bokae ka beke goba ka kgwedi?
Mohlokomedi			Mohlokomedi		
yo mongwe			yo mongwe		
yo mongwe			yo mongwe		
Total			Total		

Le humana phenšene ya mošomo? Ke bokae?		ka kgwedi

5.b Informal sector income

Mokgwa o mongwe wa go iphediša ke ofe? / Le na le mošomo wa lebakanyana?		
Mokgwa wa go iphediša (rekiša / kgwebo potlana / aga / go hiriša etc.)	Ka tlwaelo le dira bokae ka beke goba ka kgwedi?	Mohlokomedi goba yo mongwe?
		❑ mohlokomedi ❑ motho yo mongwe
		❑ mohlokomedi ❑ motho yo mongwe
		❑ mohlokomedi ❑ motho yo mongwe
		❑ mohlokomedi ❑ motho yo mongwe
		❑ mohlokomedi ❑ motho yo mongwe
Total		

5.c Government grants / other government support

Batho ba ba dulang ka mo lapeng le ba humana mphiwafela na?				
Mphiwafela wa old age		(how many)	* R 1140 =	
Mphiwafela wa bana		(how many)	* R 260 =	
Total				

Batho ba lapa le ba humana mphiwafela o mongwe wa mmušo? (other government support)	
Ke mphiwafela wa eng?	Ke bokae ka kgwedi?

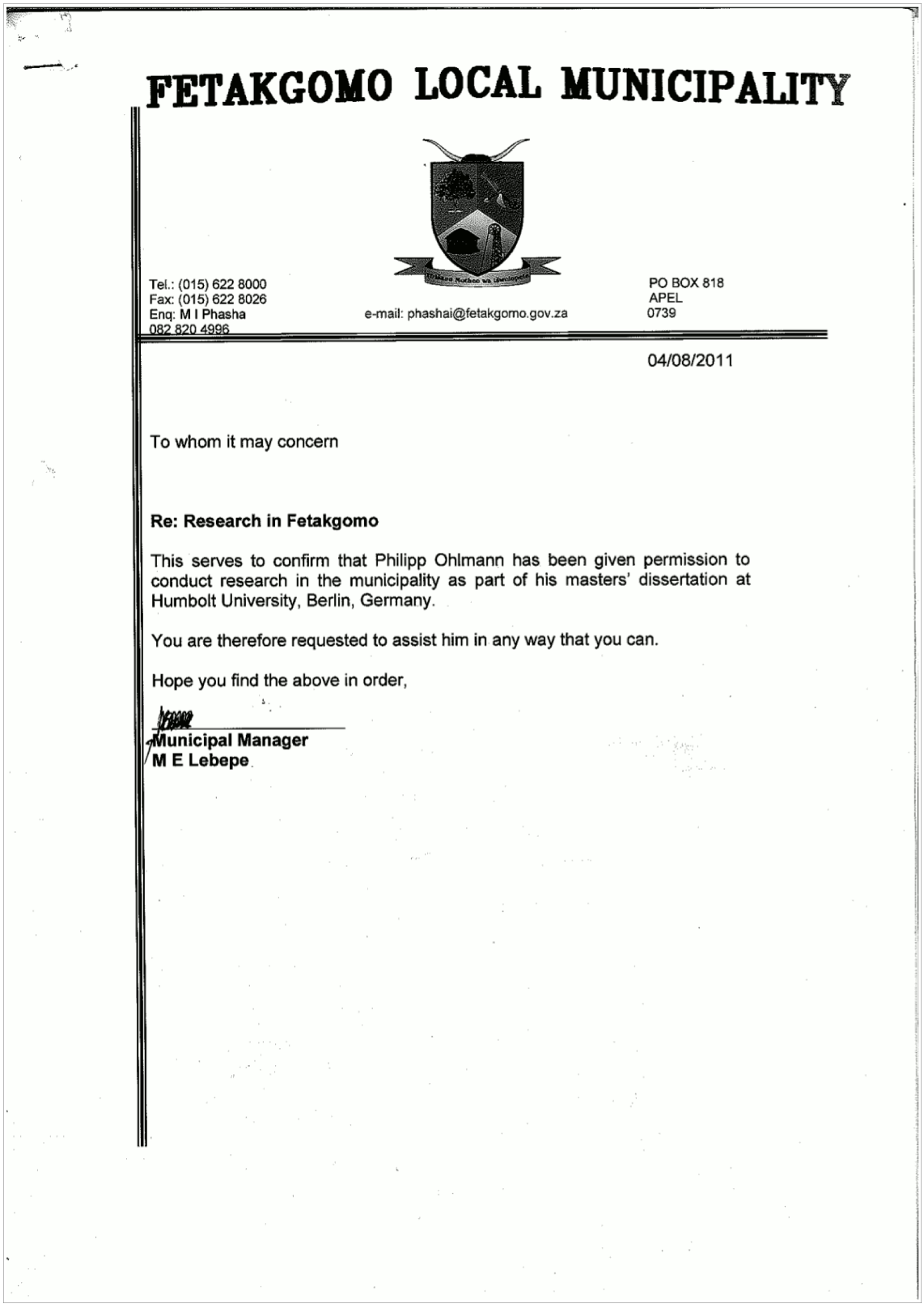
Lelapa le humana mohlagase wa mahala? (free basic electricity)		[0/1]

5.d Remittances

Le humana thušo ya batho ba ba sa dulego ka mo lapeng le?			
	Ke eng le lena?	**O le thuša ka eng?**	**Tšelete goba tšelete ya bokae?**
1			
2			
3			
4			
Lena le thuša batho ka tšelete goba dilo tše dingwe? (negative remittances)			
Total			

Total income excluding agriculture	
Total overall income	

Appendix 2: Permission Letter of Fetakgomo Local Municipality



FETAKGOMO LOCAL MUNICIPALITY

Tel.: (015) 622 8000
Fax: (015) 622 8026
Enq: M I Phasha
082 820 4996

e-mail: phashai@fetakgomo.gov.za

PO BOX 818
APEL
0739

04/08/2011

To whom it may concern

Re: Research in Fetakgomo

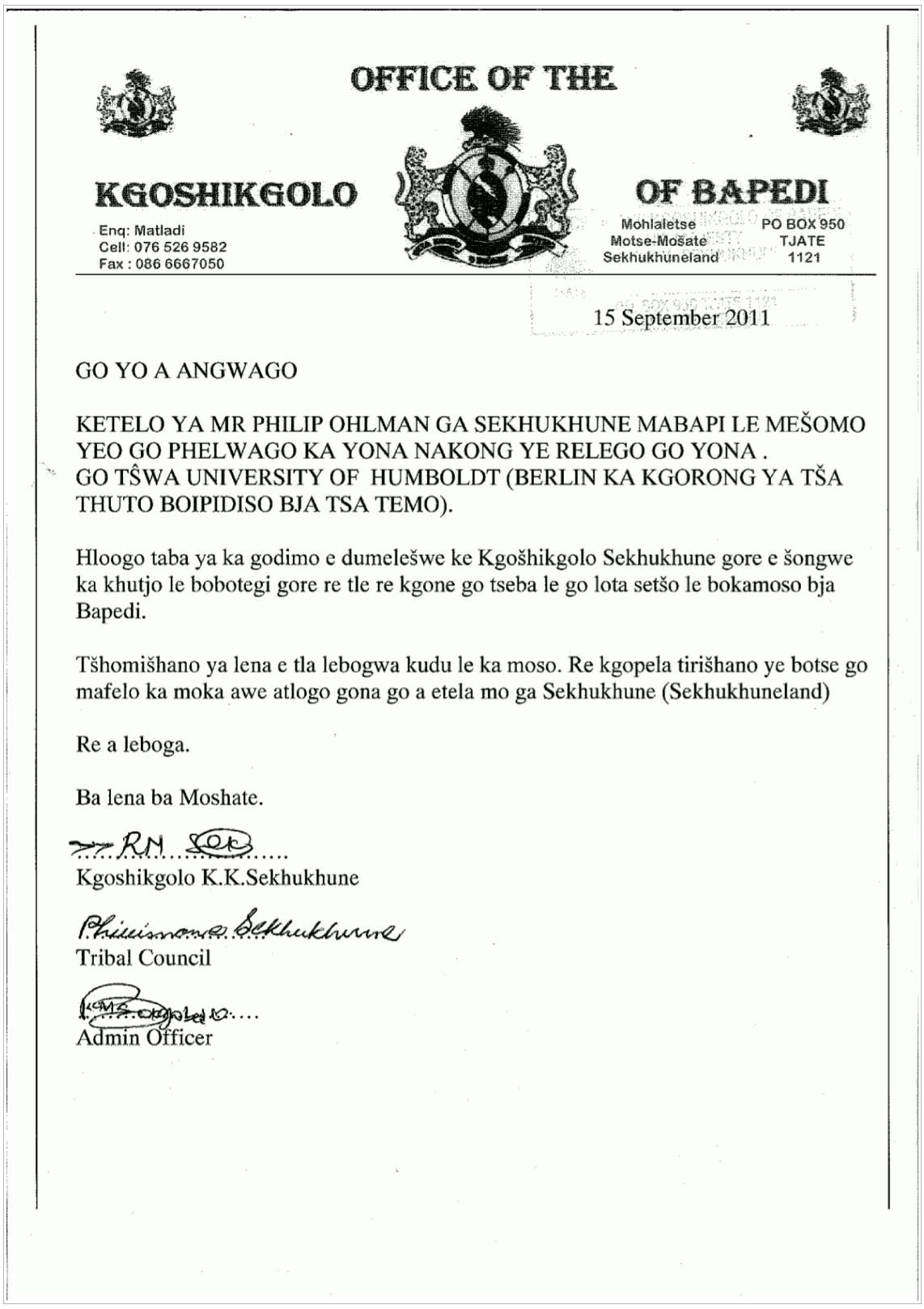
This serves to confirm that Philipp Ohlmann has been given permission to conduct research in the municipality as part of his masters' dissertation at Humbolt University, Berlin, Germany.

You are therefore requested to assist him in any way that you can.

Hope you find the above in order,

Municipal Manager
M E Lebepe

Appendix 3: Permission Letter of King Sekhukhune and Supporting Documents



OFFICE OF THE

KGOSHIKGOLO OF BAPEDI

Enq: Matladi
Cell: 076 526 9582
Fax : 086 6667050

Mohlaletse
Motse-Mosate
Sekhukhuneland

PO BOX 950
TJATE
1121

15 September 2011

GO YO A ANGWAGO

KETELO YA MR PHILIP OHLMAN GA SEKHUKHUNE MABAPI LE MEŠOMO YEO GO PHELWAGO KA YONA NAKONG YE RELEGO GO YONA .
GO TŜWA UNIVERSITY OF HUMBOLDT (BERLIN KA KGORONG YA TŠA THUTO BOIPIDISO BJA TSA TEMO).

Hloogo taba ya ka godimo e dumeleŝwe ke Kgoŝhikgolo Sekhukhune gore e šongwe ka khutjo le bobotegi gore re tle re kgone go tseba le go lota setšo le bokamoso bja Bapedi.

Tŝhomišhano ya lena e tla lebogwa kudu le ka moso. Re kgopela tirišhano ye botse go mafelo ka moka awe atlogo gona go a etela mo ga Sekhukhune (Sekhukhuneland)

Re a leboga.

Ba lena ba Moshate.

RN SOK
Kgoshikgolo K.K.Sekhukhune

Phiiismonwa Sekhukhune
Tribal Council

MS Ogolo
Admin Officer

RAPHELA INCORPORATED
Attorneys and Conveyancers
Labour & Commercial Law Experts

RAPHELA HOUSE
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CNR LOOTS STREET
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E-mail:raphela@raphelainc.co.za
Reg. No: 2006/000340/07
Vat No: 4530225020

TO WHOM IT MAY CONCERN

Your Reference:	Our Reference:	Date:
	T.N. RAPHELA	05th JANUARY 2011

Dear Sir/Madam

RE: THE KINGSHIP OF THE BAPEDI NATION

There are recent developments within the nation of Bapedi, aimed at causing confusion and disrespect with regard to the authority and the dignity of the current Acting Kgoshikgolo. We now set the record straight.

We regard it as important to draw attention to the legal position in this matter, wherein a certificate has been issued to the effect that Kgoshikgolo K.K. Sekhukhune is the current and only Kgoshikgolo of the Bapedi nation, and the only one empowered and authorised as such. This position has been confirmed through previous Court judgments; and is further in line with the decision of the Mohlaletsi Traditional Authority. Any other pretender to the throne of Kgoshikgolo falls short of the legal recognition and traditional authority vested upon the incumbent.

Therefore, we are firmly opposed to any suggestion that seeks to negate the above position, and advise that such wrong suggestions, rumours and disseminations will be challenged by the use of all the legal power at our disposal.

Yours faithfully

RAPHELA INCORPORATED
Per: Mr. I.N. Raphela

NORTHERN PROVINCE

Certificate of Appointment

Kgagudi Kenneth Sekhukhune

BY VIRTUE OF THE POWERS VESTED IN ME IN TERMS
OF SECTION 2 (8)
OF THE BLACK ADMINISTRATION
ACT, ACT NO. 38 OF 1927,
I NGOAKO ABEL RAMATLHODI,
PREMIER OF THE NORTHERN PROVINCE
DO HEREBY APPOINT
Kgagudi Kenneth Sekhukhune
AS ACTING KGOSHI OF MAROTA MOHLALETSI
TRADITIONAL AUTHORITY
AND ACTING PARAMOUNT KGOSHI OF
SEKHUKHUNELAND
IN TERMS OF SECTION 8 OF ACT NO. 38
OF 1927 WITH EFFECT FROM 26 OCTOBER 2000.

.....

PREMIER: NORTHERN PROVINCE

Appendix 10

SUIDAFRIKAANSE POLISIEDIENS
STASIEKOMMISSARIS
2002 -03- 12
STATION COMMISSIONER
SEKHUKHUNE
SOUTH AFRICAN POLICE SERVICE

DEPARTMENT: JUSTICE AND CONSTITUTIONAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

CERTIFICATE OF JURISDICTION

Under sections 12 and 20 of the Black Administration Act, 1927 (A ct No. 38 of 1927),

I, PENUELL MPAPA MADUNA

Minister for Justice and Constitutional Development, hereby authorize

ACTING KGOSHIKGOLO KGAGUDI KENNETH SEKHUKHUNE

on

29.01.2002

to hear and determine civil matters; and try criminal matters within the area of jurisdiction in respect of which he has been appointed.

MINISTER FOR JUSTICE AND CONSTITUTIONAL DEVELOPMENT

J 277

Appendix 4: Workshop Agenda and Attendance Registers

Rapid Rural Appraisal Workshops

Thursday, 11 August 2011

Introduction

I am Philipp Öhlmann. I come from Germany and study and work at Humboldt University Berlin. At the Department of Agricultural Economics. I am a student, doing my master's degree there, in agricultural economics. I am in the last year of my master's. The only thing that I am left with is the master's dissertation. And this is what I am busy with right now. I am here for two weeks, staying in Lebowakgomo.

This is Mr Sam Moifatswane, of the Museum of Arts and Culture. He is supporting me with my research. He will help me to facilitate this workshop and he will also be translating from Sesotho sa Leboa into English for me. I learned a little bit of Sotho at university, but do not understand everything. But as I want everybody to express themselves freely, I considered it best to hold the workshop in Sesotho sa Leboa. And furthermore, we are in the area of the Bapedi and hence we should speak Sepedi.

For the research for my dissertation I have decided to work in Fetakgomo Municipality. The topic of my research are the ways people support themselves. How people live and how they manage to generate income and other necessities for their survival. Using econometrics I will then link this information to people's religious beliefs in order to see in what ways religion possibly affects people's economic situation. This is now the pre-study, where I try to gather very broad information from communities and to prepare for the survey to follow. In September I will then be here again and do a household survey in the whole municipality.

I am a student. And as I am a student I am here to learn. It is not the purpose of my visit to tell you what you must do or how you must lead your lives. I see very many happy people around me, why must I tell you to change your lives? Quite the contrary, I believe, if I want to study this area and to do research on the people in Fetakgomo Municipality, I should first learn from you. I think the best way we can progress, is if we learn from each other.

Although I am not in a position to give much expertise, I will compile a research report. This report I will also submit to the municipality and to the traditional council. Someone then can read my research when it comes to making policy decisions and when implementing development strategies in this area.

Before we can start, I would like to thank you all very much for attending this workshop. I also would like to thank the Municipality of Fetakgomo granting me permission to conduct research and the ward councilor for organizing this workshop.

Matseno

Ke nna Philipp Öhlmann. Ke tšwa šeremane. Ke dula kua Berlin. Ke ithuta kua yunibesithi ya Humboldt, ke šoma kua yunibesithing yeo. Ke moithuti wa thuto-boiphedišo bja temo (agricultural economics). Ke nna moithuti yo a dirago tikrii ya masters ya thuto-boiphedišo bja temo. Ngwaga wo ke ngwaga wa boraro wa master's tikrii ya ka. Ke nagana gore ke tlo fetša go ithuta mafelelong a ngwaga wo. Selo se tee se ke swanetšego go se dira ke master's dissertation, gape bjalo ke ngwala dissertation yeo. Ke mo Afrika Borwa dibeke tše pedi ke dula kua Lebowakgomo.

Morena yo ke Morena Sam Moifatswane, wa Museum wa History le Culture kua Pretoria. Yena o nthuša ka nyakišišo ya ka (research). O tlo nthuša go nolofatša kopano ye (facilitate), o tlo fetolela polelo go tšwa Sesothong sa Leboa go ya go Seisimaneng. Nna ke ithutile Sesotho sa Leboa gannyane kua yunibesithing ya Berlin, gomme ga ke kwešise mantšu ka moka.

Gape nna ke nyaka gore batho bohle ba bolele ka boiketlo (comfortably), lelemeng la bona. Ka baka le, ke tšere sephetho sa go dira kopano ye ka leleme la Sesotho sa Leboa (took the decision). Gape, rena re mo BoPedi, ka gona re swanetše go bolela SePedi.

Taba ya nyakišišo (research) ke mekgwa ya go iphediša ya batho. Ke nyaka go tseba gore batho ba phela

bjang, batho ba hwetša tšhelete le dijo le dilo tše dingwe bjang. Ge ke kgobokeditše tshedimošo ye (gathered information), ke tlo leka go bona gore tumelo e fetola bophelo le maano a bophelo bjang. Ke tšere sephetho go dira nyakišišo ye mo mmasepaleng wa Fetakgomo, ka gobane ke mmasepala wa magaeng (rural). Pele ke dira tsekatseko (pre-study), ke leka go kgoboketša tshedimošo ye ntšhi (broad information) mo motseng (villages). Morago ke tlo dira nyakišišo ya malapa a mantšhi go lokišetša nyakišišo ye kgolo ye e tlago. Ka September ke tlo boa go dira dinyakišišo tikologong (within) ya mmasepala wa Fetakgomo ka moka.

Ke nna moithuti. Ke tlile mo go ithuta. Ga ke a tla mo go ruta batho. Ga se tabakgolo (purpose) ya ka go ba botša gore ba swanetše go dira selo se goba go dira selo sela goba ba swanetše go phela bjang. Ke bona batho ba lethabo mo. Nna ga ke kgone go le botša gore le phele gabotse bjang. Aowa, ke nagana gore, ge be ke nyaka go ithuta tikologo ye (area) le batho ba mmasepala wa Fetakgomo, go bohlokwa gore lena le nthute pele. Go iša pele (progress) re swanetše go rutana.

Etšwe ga ke kgone go fa tshepišo ye kgolo (advice), fela nyakišišo ya ka e ka le thuša. Mafelelong ke tlo ngwala sengwalwa sa nyakišišo ya ka (research report). Ke tlo e romela mmasepala le mošate. Batho ba bangwe ba kgone go bala sengwalwa sa ka. Mogongwe sengwalwa se se ka thuša batho bao ba dirago diprojecte tša tšwelopele mo Fetakgomo.

Pele ga go thoma kopano ye, ke nyaka go le leboga go tla mo. Gape, ke leboga kudu mmasepala wa Fetakgomo go ntumelela go dira dinyakišišo mmasepaleng. Gape, ke leboga mokansilara go rulaganya (organise) kopano ye.

A re thomeng. Go na le ditaba tše tharo: E lego mekgwa ya go iphediša, temo le tumelo (taba ya mathomo, taba ya bopedi, taba ya boraro). Bjalo, taba ya mathomo ke mekgwa ya go iphediša ya batho. Ke nyaka go tseba gore batho ba phela bjang, batho ba hwetša tšhelete le dijo le dilo tše dingwe bjang.

1. Mekgwa ya go iphediša – ways to support oneself / income sources

(a) Brainstorming

Big sheet of paper: write “MEKGWA YA GO IPHEDIŠA” in the middle and collect ideas

- Make sure everybody participates
- No discussion, only ideas

(b) Ranking

i. Papers on the ground with the “ways to support oneself” outlined above
ii. People to put their stones on the most important strategies for them. They can either put all three stones on one or they put the three stones on different papers.
iii. Have someone count the stones and write the ranking on the brainstorming poster

(c) Find out detailed information about the “ways to support oneself” mentioned (at least the important ones)

i. How much can one make (per day, per week or per month) from the activities (such as selling sweets)? *Motho o kgona go dira bokae ka letsatsi ge kgwebo ya gagwe e sepela gabotse? Ge e sa sepele gabotse o kgona go dira bokae?*
ii. For each (important) activity try to find out how much one can make by doing it.

- Objectives: To find out what income sources / means of survival people have and their relative importance. We need to find out any means of gaining income that are employed by the local people. It is of essential importance that we do not miss anything. That is not reduced to monetary income, but should include **non-monetary** social support by **government** (houses, water(?), electricity(?), etc) as well as support by **relatives**, **neighbours**, etc. **in kind**.

Bjalo ke kgopela gore re bolele ka temo.

2. Agriculture (temo)

[Most likely, agriculture will be one point mentioned in the above brainstorming session.]

(a) Brainstorming

Big sheet of paper: write “TEMO” in the middle and collect ideas

- Make sure everybody participates
- No discussion, only ideas

(b) Ranking

i. Papers on the ground with the agricultural activities outlined above
ii. People to put their stones on the most important strategies for them. They can either put all three stones on one or they put the three stones on different papers.
iii. Have someone count the stones and write the ranking on the brainstorming poster

(c) Find out detailed information about all the activities mentioned (at least the important ones)

i. What size is a normal field?
ii. Land: How does one determine where to set up a field? Who "assigns" the land?
iii. How much (quantity) can one get off a field of (mahea, mabele, merogo, dikenywa, etc)...
...in a good year?
...in a bad year?
iv. How much does one get for what quantity?
v. How much livestock an an average family keep?
vi. How is determined how much livestock to keep? (disposable family labour? land?)
vii. For how much can one sell livestock?
viii. Where can one sell agricultural products?
ix. Water: How can one gain access to water? Do people irrigate their gardens? Can some produce more because they have access to water?

- Objectives:
  - To find out what people grow on their fields and which of these are most important.
  - How much is harvestes and what the money value of it is.
  - How much livestock (kgogo, pudi, nku, kgomo, etc) is kept and what the money value of it is.
  - To get benchmark figures for individual questionnaire.

3. Religion (tumelo)

(a) Brainstorming

Big sheet of paper: write "TUMELO" in the middle and ask people to contribute

- It should be clear to everybody that belief is to include not only churches, but also traditional beliefs

(b) Ranking

i. Papers on the ground with the religious beliefs/religious groups outlined
ii. People to put their stones on the ones they attend or practice. They can either put all three stones on one paper or they put the three stones on different papers.

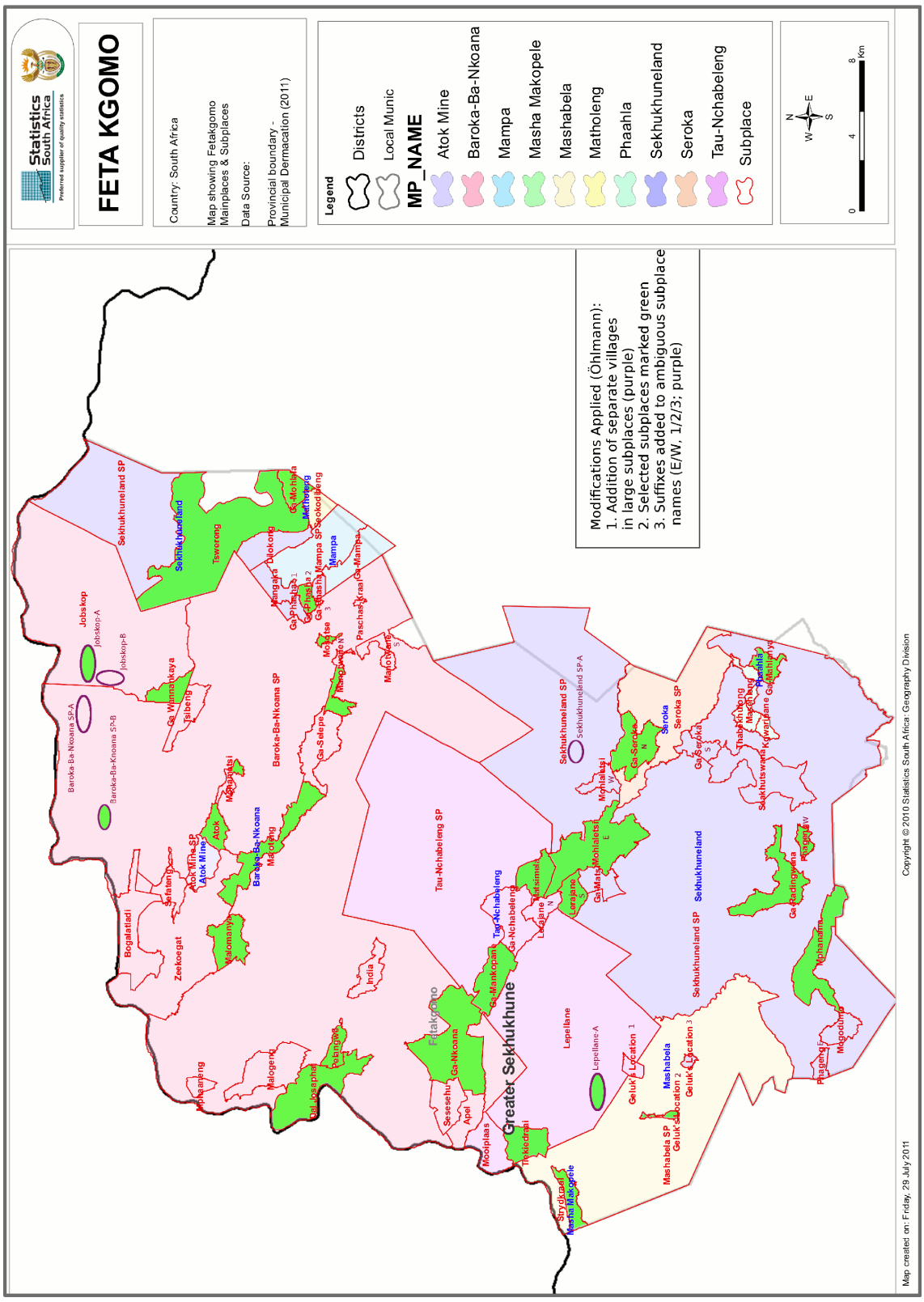
- Writing the "score" on the poster is not necessary, but can be done if anyone whishes.
- It is important to observe how people put their stones. All in one or do they split their three stones?

- Objectives
  - To find out which religions / beliefs people practice
  - To find out if people attend multiple churches or practice both christian and traditional religion.

***All questions should be as open as possible**

[Attendance registers contain individual names; omitted for privacy protection]

Appendix 5: Map and List of Places and Subplaces in Fetakgomo Municipality



Cluster Name	Included in Sampling Frame	Households Counted
Atok	1	25
Baroka-Ba-Nkoana A	1	47
Dal Josaphat	1	121
Ga-Mahlanya	1	32
Ga-Mankopane	1	965
Ga-Mohlala	1	91
Ga-Nkoana	1	1860
Ga-Phasha B	1	105
Ga-Radingwana	1	840
Ga-Seroka N	1	529
Ga-Wannankaya	1	159
Geluk's Location B	1	51
Jobskop A	1	92
Lepellane A	1	94
Lerajane S	1	437
Malomanya	1	186
Manotwane N	1	320
Maroteng	1	546
Matsimela	1	266
Mohlaletsi E	1	2066
Mohlaletsi W	1	217
Monamotsi	1	222
Mosotse	1	70
Mphanama	1	1172
Pelangwe	1	123
Phageng W	1	117
Sekhukhuneland-A	1	132
Strydkraal	1	291
Tiekiedraai	1	478
Tswereng	1	238
Apel	0	
Baroka ba Nkoana B	0	
Bogalatladi	0	
Dilokong	0	
Ga-Mampa	0	
Ga-Matsi	0	
Ga-Nchabeleng	0	
Ga-Phasha A	0	
Ga-Phasha C	0	
Ga-Selepe	0	
Ga-Seroka S	0	
Geluk's Location A	0	
Geluk's Location C	0	
India	0	
Jobskop B	0	
Kgwaripane	0	
Lerajane N	0	
Malogeng	0	
Mangaka	0	
Manotwane S	0	
Masehleng	0	
Mogodumo	0	
Mooiplaas	0	
Mphaaneng	0	
Paschas Kraal	0	
Phageng E	0	
Sefateng	0	
Sesesehu	0	
Thabekhulong	0	
Tsibeng	0	
Zeekoegat	0	
total number of clusters	**61**	
number of clusters selected	**30**	**11892 (in selected clusters)**
average cluster size		**396.4**
number of households in municipality according to CS 2007		**21851**
number of Interviews		**221**
effective sampling rate (one in … households)		**53.8**
probability of selection		**0.91%**

Appendix 6: Data Provided by DAFF and Accompanying Correspondence

RE: Data on average yields in South African / Limpopo agriculture

Betreff: RE: Data on average yields in South African / Limpopo agriculture
Von: Makgato Mathipa <makgatomm@agric.limpopo.gov.za>
Datum: 01.02.2012 13:20
An: Thikolomopop <Tshikolomo@gmail.com>, "philipp.oehlmann@agrar.hu-berlin.de" <philipp.oehlmann@agrar.hu-berlin.de>, Tshikolomo Khathu <Tshikolomoka@agric.limpopo.gov.za>, "philipp.oehlmann@agrar.hu-berlin.de" <philipp.oehlmann@agrar.hu-berlin.de>
Kopie (CC): NesamvuniEPOP <Nesamvunie@gmail.com>

Morning,

Kindly receive the information as requested.

Thank you.

From: tshikolomo@gmail.com [mailto:tshikolomo@gmail.com]
Sent: 20 January 2012 05:35 PM
To: Makgato Mathipa; .ramorokamm@agric.limpopo.gov.za
Subject: Fw: Data on average yields in South African / Limpopo agriculture

Mr Makgato, please coordinate a response to this request.
Sent via my BlackBerry from Vodacom - let your email find you!

From: Philipp Öhlmann <philipp.oehlmann@agrar.hu-berlin.de>
Date: Fri, 20 Jan 2012 13:44:30 +0100
To: Edward Nesamvuni<nesamvunie@gmail.com>
Cc: Tshikolomo Khathu<tshikolomo@gmail.com>; Tshikolomo Khathu<Tshikolomoka@agric.limpopo.gov.za>
Subject: Re: Data on average yields in South African / Limpopo agriculture

Dear Edward, Dear Tshikolomo -

Many thanks for your response. I am still very much in need on the information and really appreciate your support. Do not hesitate to cantact me in case of further questions.

Yours Sincerly -
Philipp Öhlmann

Am 17.01.2012 20:08, schrieb Edward Nesamvuni:

```
Hello Philipp

I am sorry to respond this late to your email. I have bee out of the
office for holidays and just returned to the office. I have copied
this message to our Director Crop Production who will assist to locate
the information you require on yields.

Kind Regards

Edward Nesamvuni

On 12/3/11, Philipp Öhlmann <philipp.oehlmann@agrar.hu-berlin.de> wrote:
     Dear Dr. Nesamvuni -

     I am a researcher at the Department of Agricultural Economics at
```

RE: Data on average yields in South African / Limpopo agriculture

Humboldt University Berlin, Germany. My research deals with subsistence / smallholder agriculture in Limpopo (specifically: Fetakgomo Municipality, Greater Sekhukhune District).

For the research I need data on average per hectar yields in South African / Limpopo agriculture for various crops, fruits and vegetables. Would you perhaps be able to tell me where I can find such data? Furthermore, would you know of any data on the average yield of _subsistence / non-commercial_ farming activities?

Should you not be the right person to assist, I kindly ask you to refer me to the right person.

Your assistance is greatly appreciated, many thanks in advance.

Yours Sincerely,
Philipp Öhlmann

Anhänge:

Average Yields (Selected Crops) 27 Jan. 2012.doc 39.5 KB

AVERAGE YILEDS OF SELECTED CROPS.

IRRIGATION	CROP COMMODITY	YIELDS (tons/ha)
	Maize	8+
	Wheat	5+
	Groundnuts	3+
	Drybean	3+
	Soybeans	4+
DRYLAND (RAIN-FED)	Maize	3.5
	Wheat	2.5
	Groundnuts	2.2
	Drybean	1.5
	Soybeans	2
	Sorghum	2.3
	Sunflower	1.9
	Cowpea	2.1
IRRIGATION	Garlic	6
	Sweet potato	70
	Cabbage	75
	Onions	30
	Beetroots	30
	Butternut	20
	Carrots	25
	Beans	15
	Tomato	60
	Watermelons	30
	Spinach	17
	Hot Pepper	5

**Yields for subsistence farmers will be at least 30% lower than these average figures. You are also advised to visit the website for the Department of Agriculture, Forestry and Fisheries *(www.daff.gov.za)* and follow the link under *"Yield Estimates"*.

Betreff: RE: Data on average yields in South African / Limpopo agriculture
Von: Makgato Mathipa <makgatomm@agric.limpopo.gov.za>
Datum: 02.02.2012 09:30
An: Philipp Öhlmann <philipp.oehlmann@agrar.hu-berlin.de>

Dear Phillip

1. It is national data.
2. They are yields of one planting per harvesting period, meaning should the environment allows one can have multiple harvests in one year.
3. I am not sure about the time-period of recording of the data. The data for grain crops was sourced from the Crop Estimates Committee of the Dept. Agric. Forestry and Fisheries.
4. I will check the other information for you.

My other quick e-mail address is makgatomm@gmail.com.

Thank you.
McDonald.

From: Philipp Öhlmann [mailto:philipp.oehlmann@agrar.hu-berlin.de]
Sent: 01 February 2012 06:26 PM
To: Makgato Mathipa
Cc: Tshikolomo Khathu; NesamvuniEPOP
Subject: Re: Data on average yields in South African / Limpopo agriculture

Dear Gentlemen -

Sincere thanks for the document you sent me, which is very useful to me. I just have a few questions about the data:

- Is it national or Limpopo data?
- Are the yields of the vegetables annual yields or the yields of one planting/harvesting period?
- During what time period was the data recorded?

Furthermore, would it be possible for you to provide similar data for the following crops

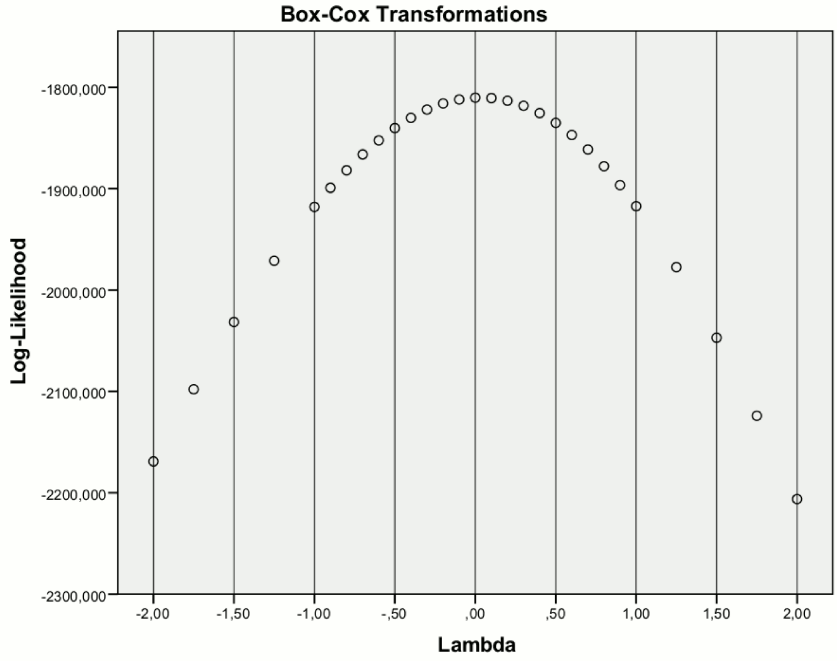
- Pumpkin (Marotse)
- Potato

and for the following fruits (either per ha or per tree)?

- Orange
- Popo
- Morula
- Mulberry
- Avocado
- Peach
- Lemon
- Grenadilla

Appendix 7: SPSS Output Box-Cox Test

```
 *   Box-Cox Transformations.
*   The Log-likelihood values together with the lambdas are shown in a diagram and in a list
    additionally there is a list of lambda values within the 95% confidence interval.
*   The basis macro for the computations stems from "SPSS Resolution number 12730"
    in the Technical Knowledgebase. (The author is unfortunately unknown.).
*  It was extended, modified and adapted to SPSS versions >= 17.
*   Author: Dr. Hans Grüner (http://gruener.userpage.fu-berlin.de)
    Last change: March 14, 2012.
preserve.
set printback=off / messages = none.
```



95% Confidence Interval

	Lambda	Log-Likelihood	Limit Log-Likelihood for Confidence Interval
1	-,10	-1812,003	-1812,129
2	,00	-1810,208	-1812,129
3	,10	-1810,623	-1812,129
N	3	3	3

Lambdas and Log-Likelihoods

	Lambda	Log-Likelihood
1	-2,00	-2169,172
2	-1,75	-2098,034
3	-1,50	-2031,630
4	-1,25	-1971,135
5	-1,00	-1917,993
6	-,90	-1899,159
7	-,80	-1881,870
8	-,70	-1866,232
9	-,60	-1852,342
10	-,50	-1840,292
11	-,40	-1830,165
12	-,30	-1822,034
13	-,20	-1815,961
14	-,10	-1812,003
15	,00	-1810,208
16	,10	-1810,623
17	,20	-1813,288
18	,30	-1818,241
19	,40	-1825,511
20	,50	-1835,116
21	,60	-1847,057
22	,70	-1861,310
23	,80	-1877,826
24	,90	-1896,524
25	1,00	-1917,295
26	1,25	-1977,377
27	1,50	-2047,119
28	1,75	-2124,085
29	2,00	-2206,271
N	29	29

Appendix 8: SPSS Syntax

Log-linear (Model A)

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
   /METHOD = ENTER gender age school tertiary mem_groups rel_chief hmems s_hmems_young
s_hmems_y51  hmems_school_ms  hmems_learn  hmems_acad  dist_road  dist_shop  clinic  church
trad_rel
  /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID)
  /SAVE RESID.
```

Log-linear (Model B)

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
   /METHOD = ENTER gender age school tertiary mem_groups rel_chief hmems s_hmems_young
s_hmems_y51 hmems_school_ms hmems_learn hmems_acad dist_road dist_shop clinic church_m
church_zn church_zl church_a church_b church_o trad_rel
  /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID)
  /SAVE RESID.
```

Correction for Selection Bias – ZCC (Model J, C, D, E)

```
* LReg leaving out rel_chief hmems_school_ms.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
  /METHOD = ENTER gender age school tertiary mem_groups hmems s_hmems_young s_hmems_y51
hmems_learn hmems_acad dist_road dist_shop clinic church_zn trad_rel
  /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID)
  /SAVE RESID.

* Probit for church_zn.
PLUM church_zn WITH gender age school tertiary mem_groups rel_chief hmems s_hmems_young
s_hmems_y51 hmems_school_ms hmems_learn hmems_acad dist_road dist_shop clinic trad_rel
    /CRITERIA=CIN(95)  DELTA(0)  LCONVERGE(0)  MXITER(20)  MXSTEP(5)  PCONVERGE(1.0E-6)
SINGULAR(1.0E-8)
  /LINK=PROBIT
  /PRINT=FIT PARAMETER SUMMARY CORB COVB
  /SAVE PREDCAT.

COMPUTE IPS = -0.8279752177011518 + 0.8324399423065632*gender -0.027187496061862302*age
-0.06851530524664945*school          +          0.03377302019841756*tertiary          +
0.002892269654328086*mem_groups + 0.33425815593658936*rel_chief
-0.007013768913775049*hmems              +              0.770207824567829*s_hmems_young
-0.14776643414127633*s_hmems_y51 -0.11043566445387823*hmems_school_ms
+0.11630073106344262*hmems_learn        +        0.3449952099866622*hmems_acad        +
0.005208732322316272*dist_road
+          0.0036196173881997144*dist_shop          +          0.1802780648124708*clinic
-1.119730902764597*trad_rel.

If (church_zn=1) LAMBDA = ((1/sqrt(2*3.141592654))*(exp(-IPS*IPS*0.5)))/cdfnorm(IPS).
If    (church_zn=0)    LAMBDA    =    -((1/sqrt(2*3.141592654))*(exp(-IPS*IPS*0.5)))/(1-
cdfnorm(IPS)).

COMPUTE DELTA = - LAMBDA*IPS - LAMBDA*LAMBDA.
DESCR DELTA /statistics = min max

COMPUTE LAMBDA_1 = church_zn * LAMBDA.
COMPUTE LAMBDA_0 = (1 - church_zn) * LAMBDA.

COMPUTE DELTA_1 = -LAMBDA_1*IPS - LAMBDA_1*LAMBDA_1.
```

```
COMPUTE DELTA_0 = -LAMBDA_0*IPS - LAMBDA_0*LAMBDA_0.
DESCR DELTA_1 /statistics = min max.
DESCR DELTA_0 /statistics = min max.

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
   /METHOD = ENTER gender age school tertiary mem_groups hmems s_hmems_young s_hmems_y51
hmems_learn hmems_acad dist_road dist_shop clinic church_zn trad_rel LAMBDA
  /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID)
  /SAVE RESID.

* Korrektur der Standardfehler.
* LAMB = geschätzter Koeffizient für LAMBDA.
COMPUTE RES2 = RES_3 * RES_3.
COMPUTE LAMB =-0.11070012084859969.
COMPUTE N=180.

COMPUTE HELP = 1.
AGGREGATE /outfile=A /break=HELP
/RESS=sum(RES2)
/DELTAS=sum(DELTA).
MATCH FILES /table=A /file=* /by HELP.

COMPUTE VARC = RESS/N-LAMB*LAMB*DELTAS/N.
COMPUTE SEC = sqrt(VARC).

COMPUTE RHO = sqrt(LAMB*LAMB/VARC).
If (LAMB<0) RHO = 0 - RHO.

REPORT /variables=VARC SEC RHO /break=(total)
/summary=mean (VARC(4) SEC (4) RHO(4)).

COMPUTE RHOI = sqrt(VARC+LAMB*LAMB*DELTA).
COMPUTE WGT = 1/RHOI.

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
   /METHOD=ENTER gender age school tertiary mem_groups hmems s_hmems_young s_hmems_y51
hmems_learn hmems_acad dist_road dist_shop clinic church_zn trad_rel LAMBDA
  /REGWGT=WGT.

* Same procedure with differing coefficients of Lambda.

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
   /METHOD = ENTER gender age school tertiary mem_groups hmems s_hmems_young s_hmems_y51
hmems_learn hmems_acad dist_road dist_shop clinic church_zn trad_rel LAMBDA_1 LAMBDA_0
  /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID)
  /SAVE RESID.

* Parameter für LAMBDA_1.
* Parameter für LAMBDA_0.
COMPUTE RES2 = RES_1 * RES_1.
COMPUTE LAMB_1 = -0.09179169004567433.
COMPUTE LAMB_0 = 1.5314685623226296.
COMPUTE N=180.

COMPUTE HELP = 1.
AGGREGATE /outfile=A /break=HELP
/RESS=sum(RES2)
/DELTAS=sum(DELTA).
MATCH FILES /table=A /file=* /by HELP.

If (church_zn=1) VARC = RESS/N - LAMB_1*LAMB_1*DELTAS/N.
If (church_zn=0) VARC = RESS/N - LAMB_0*LAMB_0*DELTAS/N.
```

```
COMPUTE SEC = sqrt(VARC).

If (church_zn=1) RHO = sqrt(LAMB_1*LAMB_1/VARC).
If (LAMB_1<0) RHO = 0 - RHO.
If (church_zn=0) RHO = sqrt(LAMB_0*LAMB_0/VARC).
If (LAMB_0<0) RHO = 0 - RHO.

REPORT /variables=VARC SEC RHO /break=(total)
/summary=mean (VARC(4) SEC (4) RHO(4)).

If (church_zn=1) RHOI = sqrt(VARC+LAMB_1*LAMB_1*DELTA).
If (church_zn=0) RHOI = sqrt(VARC+LAMB_0*LAMB_0*DELTA).

COMPUTE WGT = 1/RHOI.

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
   /METHOD=ENTER gender age school tertiary mem_groups hmems s_hmems_young s_hmems_y51
hmems_learn hmems_acad dist_road dist_shop clinic church_zn trad_rel LAMBDA_1 LAMBDA_0
  /REGWGT=WGT.
```

Correction for Selection Bias – Traditional Religion (Model K, F, G, H)

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
  /METHOD = ENTER gender age school tertiary rel_chief hmems s_hmems_y51 hmems_school_ms
hmems_learn hmems_acad dist_road dist_shop church trad_rel
  /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID)
  /SAVE RESID.

PLUM trad_rel WITH  gender age school tertiary mem_groups rel_chief hmems s_hmems_young
s_hmems_y51 hmems_school_ms hmems_learn hmems_acad dist_road dist_shop clinic church
     /CRITERIA=CIN(95)  DELTA(0)  LCONVERGE(0)  MXITER(20)  MXSTEP(5)  PCONVERGE(1.0E-6)
SINGULAR(1.0E-8)
  /LINK=PROBIT
  /PRINT=FIT PARAMETER SUMMARY CORB COVB TPARALLEL
  /SAVE PREDCAT.

COMPUTE IPS = -1.0785289321140423 -0.4042498883060868*gender -0.0002803202765003288*age
-0.037292491658536264*school + 0.12500599263671797*tertiary +
0.19765336303868325*mem_groups              +              0.08733494063311142*rel_chief
-0.007139457253243935*hmems + 0.9040124471093577*s_hmems_young +
0.4461947792064775*s_hmems_y51          -0.010391714943345275*hmems_school_ms          +
0.033055285116476034*hmems_learn+ 0.35017476752505416*hmems_acad +
0.0006742950781212782*dist_road             +             0.0056286894573902724*dist_shop
-0.5160718038508199*clinic -2.0273862925320825*church.

If (trad_rel=1) LAMBDA = ((1/sqrt(2*3.141592654))*(exp(-IPS*IPS*0.5)))/(cdfnorm(IPS)).
If    (trad_rel=0)    LAMBDA    =    -((1/sqrt(2*3.141592654))*(exp(-IPS*IPS*0.5)))/(1-
cdfnorm(IPS)).

COMPUTE DELTA =-LAMBDA*IPS-LAMBDA*LAMBDA.
DESCR DELTA /statistics = min max

COMPUTE LAMBDA_1 = trad_rel * LAMBDA.
COMPUTE LAMBDA_0 = (1 - trad_rel) * LAMBDA.

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
  /METHOD = ENTER gender age school tertiary rel_chief hmems s_hmems_y51 hmems_school_ms
hmems_learn hmems_acad dist_road dist_shop church trad_rel LAMBDA
  /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID)
  /SAVE RESID.
```

```
* Korrektur der Standardfehler.
* LAMB = geschätzter Koeffizient für LAMBDA

COMPUTE RES2 = RES_2 * RES_2.
COMPUTE LAMB = -0.02694577874835795.
COMPUTE N=180.

COMPUTE HELP = 1.
AGGREGATE /outfile=A /break=HELP
/RESS=sum(RES2)
/DELTAS=sum(DELTA).
MATCH FILES /table=A /file=* /by HELP.

COMPUTE VARC = RESS/N-LAMB*LAMB*DELTAS/N.
COMPUTE SEC = sqrt(VARC).

COMPUTE RHO = sqrt(LAMB*LAMB/VARC).
If (LAMB<0) RHO = 0 - RHO.

REPORT /variables=VARC SEC RHO /break=(total)
/summary=mean (VARC(4) SEC (4) RHO(4)).

COMPUTE RHOI = sqrt(VARC+LAMB*LAMB*DELTA).
COMPUTE WGT = 1/RHOI.

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
   /METHOD=ENTER gender age school tertiary rel_chief hmems s_hmems_y51 hmems_school_ms
hmems_learn hmems_acad dist_road dist_shop church trad_rel LAMBDA
  /REGWGT=WGT.

* Same procedure with differing coefficients of Lambda.

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
  /METHOD = ENTER gender age school tertiary rel_chief hmems s_hmems_y51 hmems_school_ms
hmems_learn hmems_acad dist_road dist_shop church trad_rel LAMBDA_1 LAMBDA_0
  /RESIDUALS DURBIN HISTOGRAM(ZRESID) NORMPROB(ZRESID)
  /SAVE RESID.

* LAMB_1 = geschätzter Koeffizient für LAMBDA_1.
* LAMB_2 = geschätzter Koeffizient für LAMBDA_0.

COMPUTE RES2 = RES_2 * RES_2.
COMPUTE LAMB_1 = 0.04504640223709058.
COMPUTE LAMB_0 = 0.9392103995660299.
COMPUTE N=180.

COMPUTE HELP = 1.
AGGREGATE /outfile=A /break=HELP
/RESS=sum(RES2)
/DELTAS=sum(DELTA).
MATCH FILES /table=A /file=* /by HELP.

If (trad_rel=1) VARC = RESS/N - LAMB_1*LAMB_1*DELTAS/N.
If (trad_rel=0) VARC = RESS/N - LAMB_0*LAMB_0*DELTAS/N.
COMPUTE SEC = sqrt(VARC).

If (trad_rel=1) RHO = sqrt(LAMB_1*LAMB_1/VARC).
If (LAMB_1<0) RHO = 0 - RHO.
If (trad_rel=0) RHO = sqrt(LAMB_0*LAMB_0/VARC).
If (LAMB_0<0) RHO = 0 - RHO.

REPORT /variables=VARC SEC RHO /break=(total)
/summary=mean (VARC(4) SEC (4) RHO(4)).

If (trad_rel=1) RHOI = sqrt(VARC+LAMB_1*LAMB_1*DELTA).
If (trad_rel=0) RHOI = sqrt(VARC+LAMB_0*LAMB_0*DELTA).
```

```
COMPUTE WGT = 1/RHOI.

REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT LN_INC
   /METHOD=ENTER gender age school tertiary rel_chief hmems s_hmems_y51 hmems_school_ms
hmems_learn hmems_acad dist_road dist_shop church trad_rel LAMBDA_1 LAMBDA_0
  /REGWGT=WGT.
```

Nonlinear Regression (Model I)

```
* NLREG with multiple church dummies and split ZCC
* NonLinear Regression.
MODEL  PROGRAM  k=6.18  d1=1  d21=1  d22=1  d3=1  d4=1  d5=1  d6=1  b1=-0.34  b2=0.02  b3=0.03
b4=0.65 b5=0.06 b6=-0.09 b7=0.1
b8=-0.18 b9=0.17 b10=0.01 b11=0.23 b12=0.36 b13=-0.02 b14=0.00 b15=0.03.
COMPUTE  PRED_= d1 ** church_m * d21 ** church_zn * d22 ** church_zl * d3 ** church_a *
d4 ** church_b * d5 ** church_o * d6 ** trad_rel
* (k + b1*gender + b2*age + b3*school + b4*tertiary + b5*mem_groups + b6*rel_chief +
b7*hmems + b8*s_hmems_young + b9*s_hmems_y51 + b10*hmems_school_ms
+ b11*hmems_learn + b12*hmems_acad + b13*dist_road + b14*dist_shop + b15*clinic).
NLR LN_INC
  /PRED PRED_
  /SAVE PRED RESID
  /CRITERIA SSCONVERGENCE 1E-8 PCON 1E-8.
```

Appendix 9: Additional Estimations

	J	K
constant	6.402***	6.508***
	(0.404)	(0.409)
gender	-0.301***	-0.314***
	(0.106)	(0.102)
age	0.014**	0.012**
	(0.006)	(0.006)
school	0.032**	0.030**
	(0.015)	(0.015)
tertiary	0.671***	0.690***
	(0.098)	(0.100)
mem_groups	0.051	
	(0.066)	
rel_chief		-0.080
		(0.059)
hmems	0.093***	0.090***
	(0.025)	(0.021)
s_hmems_young	-0.128	
	(0.231)	
s_hmems_y51	0.159	0.288
	(0.320)	(0.328)
hmems_school_ms		0.005
		(0.018)
hmems_learn	0.213	0.239
	(0.152)	(0.151)
hmems_acad	0.390**	0.411**
	(0.165)	(0.166)
dist_road	-0.029**	-0.026*
	(0.014)	(0.014)
dist_shop	0.004	0.004
	(0.003)	(0.003)
clinic	0.065	
	(0.105)	
church		0.173
		(0.126)
church_zn	0.327***	
	(0.123)	
trad_rel	0.221**	0.244**
	(0.100)	(0.121)
N, K	180,16	180,15
Adj. R^2	0.47	0.46
F-statistic	11.45	11.74
AkIC, BIC	-0.92, -0.64	-0.91, -0.64
KS-Test (p-value)	0.82	0.75

Dependent variable: *ln_inc*
Standard errors in parentheses
*, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively

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Hiermit erkläre ich, die vorliegende Masterarbeit

“HE SHALL LIFT YOU UP? THE IMPACT OF RELIGIOSITY ON ECONOMIC SUCCESS IN RURAL SOUTH AFRICA. INSIGHTS FROM A FIELD STUDY”

selbstständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt zu haben.

Berlin, den 1. August 2012

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Philipp Öhlmann